American Artisan and Hardware Record

Vol. 95, No. 1 | CHICAGO, JANUARY 7, 1928 | $2.00 Per Year

When You Become a Mueller Dealer—

you automatically become an "associate member" of the Mueller manufacturing and sales organization. And, as such a member, you have at your disposal:

1. The most complete line of heating equipment in the industry, built to the highest quality standards.
2. A complete program of advertising and sales promotion co-operation—supplied by us, FREE.
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6. Active sales co-operation—the Mueller salesman works with you and *for* you.
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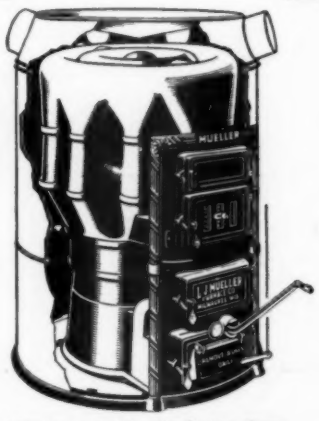

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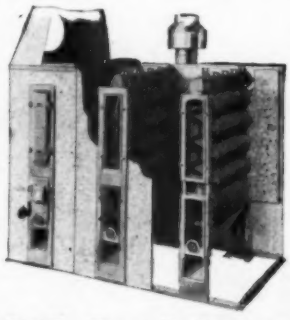

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MUELLER FURNACES

The Most Complete Line *in the* Industry

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WHEN the final advertising forms closed for the 34th Warm Air Furnace Annual of AMERICAN ARTISAN issued on December 31st, 1927, a new record was made.

This special number which is destined to live and bear fruit for both its readers and advertisers for many months to come carried *a larger volume* and *greater number* of warm air furnace and supply advertisers than that *ever carried by any other publication.*

A significant fact in regard to this record breaking issue is that practically all of the advertisers are consistent users of advertising space in AMERICAN ARTISAN throughout the year.

Another fact that is significant of the business outlook for 1928 is that more of these advertisers used *larger space* than ever before.

And this record is on its way to be broken — advertising contracts starting with the new year are for *more space*, showing that the warm air heating industry is keeping step with the other industries in following a more vigorous publicity policy for 1928 business.

1928 will reward consistent advertisers.

Published Weekly by American Artisan and Hardware Record, Inc., 620 South Michigan Avenue, Chicago, Illinois.
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Founded 1880

Published to Promote Better Warm Air Heating and Sheet Metal Work

American Artisan and Hardware Record

Sheet Metal Work-Warm Air Heating

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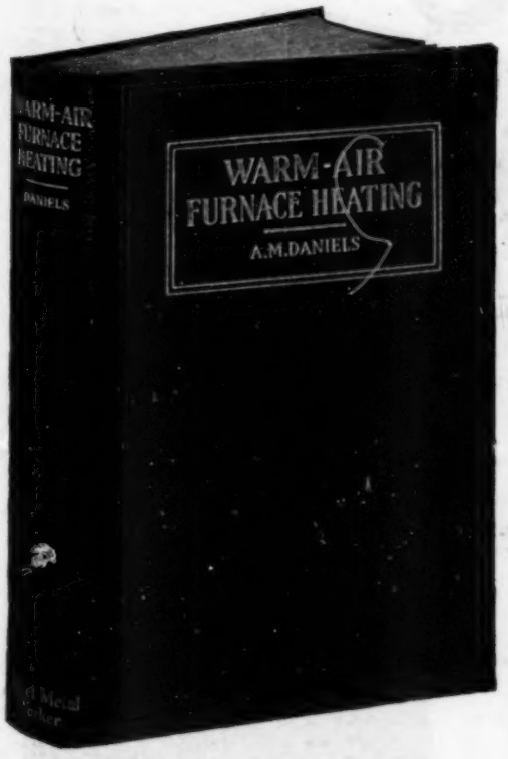
Table of Contents

PROFESSOR A. J. MACK ON FARM VENTILATION

Sheet metal contractors doing business in rural communities are constantly coming into contact with a demand for the construction and installation of ventilating systems particularly adapted to the ventilation of farm buildings. This demand leads to considerable complexity on the part of the sheet metal contractor because of the multi-varied employments of ventilation in this type of work. A cattle housing requires one type of ventilation, while a hay mow may need an aeration system entirely different.

In order to set sheet metal contractors right on this subject of farm ventilation and to give them facts which they can use to advantage, AMERICAN ARTISAN *has secured an exclusive series of articles on this subject from Professor A. J. Mack, Department of Mechanical Engineering, Kansas State Agricultural College, Manhattan, Kansas. The fourth of this series appears on page* 14 *of this issue. Please turn to that page.*

A New Book on Warm Air Heating



Just off the Press—Now ready for you

IT IS the book that thousands have been asking for —a book on Warm Air Furnace Heating that is UP-TO-DATE—a book that covers every phase of the subject giving exact data based on research work.

Written by A. M. Daniels.

Here is the book that will enable both the experienced furnace man and the student to obtain a working knowledge of up-to-date scientific warm air furnace heating.

Read over the Chapter Headings—notice the complete treatment of the subject.

Many tables are included and some big labor savers in calculating pipe sizes—also many diagrams.

Chapter Headings

1. Historical.
2. Typical Gravity Pipe Warm-Air Heating Systems.
3. Types of Warm-Air Furnaces.
4. Details of Furnace Construction.
5. Heat Losses.
6. Effect of Register-Air Temperature, Leader Area and Size of Wall Stack Upon Heating Effect Produced.
7. Insulating Coverings and Their Effect Upon Leader and Wall Stack Operation.
8. Casing Diameter vs. Furnace Capacity.
9. Air Supply to Furnace.
10. Furnace Capacity and Rating.
11. Register Grilles vs. Plant Capacity.
12. Chimneys and Flues.
13. Humidity.
14. Evaporating Pans.
15. Combination Heating Systems—Warm Air and Hot Water.
16. Gas Warm-Air Heating.
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18. One-Pipe Furnace Heating Including Modifications.
19. Hot-Water Supply.
20. Leader Pipe Sizes.
21. Forced-Air Furnace Heating.
22. Coal as Fuel.
23. Pipe and Fittings.
24. Warm-Air Registers and Cold-Air Faces.

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Only $56.00 for this gas-tight EQUATOR STEEL FURNACE

WITH THIS FURNACE YOU CAN MEET ALL COMPETITION WITH LOW PRICE AND HIGH QUALITY.

THE quality in the Equator Furnace will be easily recognized and appreciated by your trade. An Equator Steel Furnace will always command larger profits because of its many superior features, yet the cost to you is no more than that of many inferior furnaces, and if necessary you can use it for your close competition work.

Like all Lennox products, the Equator Furnace is constructed of heavy steel plates, riveted and calked under terrific pressure to form a combustion chamber that is permanently gas-tight. Materials and workmanship used in its construction are the same as we use in our Torrid Zone furnaces.

The extra radiator adds 30% more to the heating power. The fire pot is lined with the best quality fire brick. Grates are of the same design as those used in large locomotives. The smooth upright steel walls are self cleaning and it has an unusually large radiating surface. The water pan or humidifier is correctly placed at the top of the combustion chamber where evaporation is most rapid.

Consider also, that we are the largest manufacturers of steel furnaces in the world and are able to carry in our warehouses large stocks of completed furnaces, from which prompt deliveries can be made during the busy season. You can sell Equator Furnaces on the easy payment plan and we will cash all your Time Payment Contracts at 92% of their face value.

(Marshalltown Furnace Company, Subsidiary)

Lennox Furnace Company, *Inc.*

MARSHALLTOWN, IOWA SYRACUSE, NEW YORK

Write us today for complete details of the Equator Franchise for your territory.

American Artisan and Hardware Record

Vol. 95 CHICAGO, JANUARY 7, 1928 No. 1

A RETROSPECT AND A FORECAST

By Franklyn Hobbs, Business Analyst, La Salle Extension University

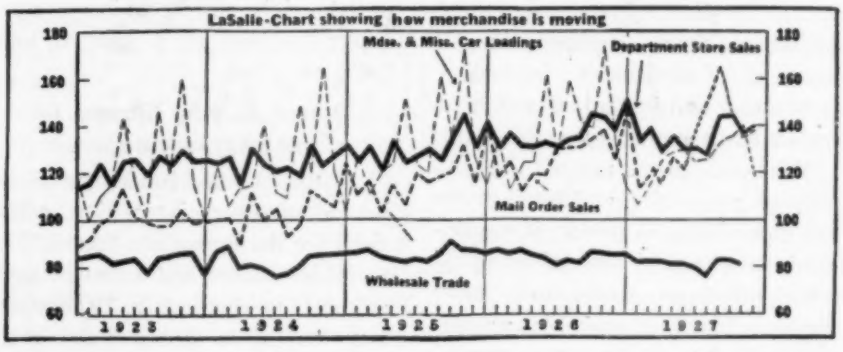
BUSINESS events have always been forecast, but the forecast, while being used, has not always been recognized as such. The architect forecasts the building and it finally appears, and fulfills his predetermined plans. The manufacturer forecasts the demand for, and sale of, certain consumable merchandise. He builds a factory, installs machinery, buys raw materials, proceeds to manufacture the goods, puts out an advertising campaign, and sends salesmen over the country to arrange for the distribution of the merchandise. The entire operation was forecast, but these well-laid plans may have been called by some other name.

Most business men have been shy of the word forecast and have constantly confused it with prophecy and guessing. Within recent years the ability to forecast business events has become generally realized, with the result that many hundreds of economists, statisticians, bankers and business executives are now publishing estimates of future business operations, as indicated by the fundamental information which they possess on past volume, and trend, in the various lines of business enterprise.

Business Records Now More Nearly Complete

Since the end of the World War records of business operations have been kept with more accuracy than previously, and we thus find ourselves possessed of a dependable record of business operations for a period of nine years. With these figures available, we should be able to determine the immediate future trend with considerable accuracy.

There was much disagreement as to the outlook for 1926; there was some disagreement as to the probable operations of 1927; there is almost unanimous agreement as to what we may expect of 1928. A few, but a very few, business men are expecting new high records to be made in practically all lines during the coming year. This would appear to be a wish rather than a belief. There is surely nothing in the history of business for 1925 to 1927, inclusive, to indicate a record-breaking year in 1928.



What the curves tell.—Two curves up and two down. They tell us that more merchandise has moved out of retailers' hands and less has moved in. As a result, dealers' stocks will need replenishing. With consumer buying power still strong, there is promise of good business during the early part of 1928.

The Business Story of Four Years

It is not difficult to recall that the business improvement which began late in 1924 continued, with an occasional temporary recession, right up to the fall months of the present year, the period of good business covering the full three years. Some easing off during 1927 was inevitable, as was indicated in our March *Business Bulletin*.

The estimate made at that time of a probable decline in total business operations of something like 3 per cent for this year, compared with 1926, has been fully substantiated by business records for the first eleven months of the year. Such figures as are available for a portion of the twelfth month are in line with the estimates. When the complete story of the year 1927 is told, the year will undoubtedly take its place as the second best business year in American history, total operations being 97 per cent to 98 per cent of those of 1926, which year set the highest mark we have ever made in production, in transportation and in consumption.

Business Analysis Now More Scientific

Scientific budgeting and analysis of business operations have now gone far enough to establish business on such a firm foundation that we can even face a presidential year with confidence and with a reasonable certainty of what we may expect. From the fall of 1924 the trend was upward to October, 1926, when the upward movement ended.

The down trend was gradual

through the closing quarter of 1926 and, except for a temporary upward swing in the spring of 1927, it has continued and still continues. During the fifteen months which have elapsed since the peak was passed the entire downward movement in all lines of business activity combined has been no more than 4 per cent, about 3 per cent of the recession falling within the calendar year 1927.

Interesting Outlook for Next Year

Even with a further recession of 1 to 3 per cent in 1928, business operations would still equal, or somewhat exceed, the showing of 1925. And 1925 was considered, and must still be considered, a year of good and satisfactory business.

An improvement in the prices of raw materials is indicated for the coming year and this, in turn, should enhance the buying power of nearly one-half of the population, including those engaged in all branches of agriculture, in lumber production and in the extraction of metals and minerals from the earth.

Wholesale prices are not likely to advance materially, and retail prices are more likely to recede, if considered as a unit. Strengthening of retail prices on foods and staple clothing items is probable, as numerous items in these two groups are now priced too close to the cost of production to permit of profitable merchandising.

It has been well demonstrated during several years of declining prices and improving business that efficiency in production, transportation and distribution is narrowing the spread between production costs and consumers' prices. This efficiency is attributable, in part, to the introduction of labor-saving machinery and processes; in part to the increasing interest and activity of the individual worker; in part to improved transportation methods; and last, but by no means least, to a more general interest in the elimination of waste of every nature.

Business On a Solid Foundation

Fundamental business conditions were never sounder, industry was never better organized and the spirit of real business co-operation was never more apparent than at this present time. The outlook for the coming year, and years, is bright, and the pessimist finds few unsatisfactory points upon which to hang his crepe. The optimist should constantly keep in mind the unprecedented business period which we have been enjoying and realize that it is not possible for each succeeding year to break all previous business records.

Perhaps the most common misunderstanding of business trends come about through a failure to consider all business operations upon a per capita basis rather than upon a bulk basis. As the population increases, the total volume of business operations must continue to increase, but if the increase is to produce greater prosperity for the individual, it must be an increase per capita, as well as a gain in total bulk, or volume.

Better Buying Power for Agriculture

A study of the fundamentals develops some very interesting indications for the immediate future. The gains in volume and value of agricultural production in 1927 added not less than one-twelfth to the gross buying power of thirty millions of people. This buying power is just now beginning to be exercised and will continue to be felt up to the harvest of 1928. A considerable reduction in farm loans has been accomplished during recent months, and the American farmer will pay $25,000,000 or $30,000,000 less in interest on his borrowings than he has paid during the current year, thus making a further addition to his net buying power.

The Engineering and Building Program

Engineering and building projects already under way, or definitely planned for the coming year, promise some betterment in the demand for iron and steel, cement and brick, with a possible slight gain in lumber consumption. Increased consumption is also indicated for most of the non-ferrous metals, especially copper, with little if any change in the coal situation. Petroleum production and refining will be determined by the degree of regulation or control exercised with the assistance or permission of the Federal Government.

Probable Increase in Manufacture and Transportation

The tonnage of freight movement, both rail and water, promises to be larger next year. The rail gain will be in freight car loadings and in freight ton-miles, and will be accounted for by the gain in population, leaving the per capita freight movement about the same as for the present year.

Considerable gains in manufacturing production are assured, the increase being principally due to the larger output of steel products for engineering projects, for railroad maintenance and equipment, and for motor cars—a material gain in production of motor car units being already determined.

Foreign Trade May Increase

The greatest benefit to business during the coming year is expected through an increase in merchandising exports. Such increase has been made possible through the foreign loans recently made, the purchase of foreign securities in the open market, and the increasing shipments of gold to other countries. Further gold exports are on the program and a number of additional foreign loans of size may be marketed here. There may also be some addition to imports of both raw materials and manufactured goods, which would still further enhance foreign demand for the products of our factories and our farms. The sentimental influence which a presidential campaign always exerts upon business will be modified in 1928 by the fact that no great economic question is involved in the campaign. The nominations and the election are not expected either to benefit or to injure business.

Profits Depend Upon Economies

Despite complaints regarding profits in the business operations of 1927, the year has set a new high record in disbursements of dividends. Most well-managed concerns have had a profitable year and are looking forward to a still better profit showing in 1928, through the carrying out of present plans for improvements and simplification in operation.

Total income, including workers' wages, for next year should be about at par with 1927, figured upon a per capita basis. The outlook is for less unemployment in the coming year, due to increased operations in some basic lines of manufacture, and the betterment which is taking place in the agricultural situation at the present time.

Reprinted from Business Bulletin, La Salle Extension University.

Trade Development Book to Be Completed by Cleveland Convention

Book Will Contain Wealth of Material on All Sheet Metal Subjects

STEADY progress has been made throughout the year by the Trade Development Committee of the National Association of Sheet Metal Contractors in preparing illustrations and manuscript for the book of standard practices in architectural sheet metal work. This work has been carried on under the chairmanship of George Harms, with special sub-committees for the several chapters of the book in preparation.

The work has been carried on by the sub-committees preparing drawings and text on the subject assigned to them. When completed by the committee these are turned over to the publication committee, so that the necessary tracings may be prepared from which zinc plates will be made for printing purposes. After the tracings are made, photostats reduced to the page size of the book are made and with the original manuscript are turned back to the sub-committee for checking purposes.

The cornice section, with the exception of one or two subjects, namely, cornices for school buildings, has been completed to the point of approved manuscript and photostats.

The skylight and metal window sections are in the same status. For the fire door section, manuscript has been prepared, the photostats made and these are now ready to turn back to the committee for its final approval.

The metal and trim section has been completed, and could be turned over to the printer on 24 hours' notice.

Manuscript has been completed on the blowpipe and exhaust section, also on the ventilating systems section, as have also drawings by the committee. Tracings have yet to be made, and as the draftsman has just completed the door section, work will be started on these immediately he gets to it.

A large number of drawings are completed on the warm air furnace section. Some additional drawings must be made and the manuscript prepared. The committee reports that it will take until probably February 1 for it to complete its work on the furnace section.

A wealth of manuscript and illustrations, including drawings, have been completed by the sub-committee on restaurant and kitchen work. Tracings will have to be made by the draftsman, and there need be no delay in proceeding with this section.

William Neubecker is handling the preparation of the drawing and text in cooperation with the sub-committee on roofing, gutters, conductors and the like. This will require from four to six weeks to complete, but in the meantime the manuscript and drawings will be turned over to the draftsman as rapidly as each subdivision of this section is completed. In fact, the drawings on the roofing proper work are in the hands of the committee now and will probably be turned over to the draftsman within a week.

For the metal ceiling section, drawings have been turned over to the publication committee, but there will have to be a few additional drawings made and the text prepared.

The committee on protective coatings and paints has done some preliminary work, but is waiting as long as possible to get the results of some research work under way as soon as possible.

The committee on metal garages can turn over its section on short notice. This leaves only the miscellaneous section, which will be the last one to be handled, and undoubtedly will be taken care of while the publication committee is completing its work of making the other drawings.

Summing up, it might be stated that greater progress has been made during the year on this work than in any previous year, and the committee hopes to have all its work practically complete by the time of the Cleveland convention which will be held in May.

C. P. Tanner, Henderson, N. C., Changes Name to Tanner Roofing Co.

Effective January 1, 1928, the firm name of C. P. Tanner was changed to the Tanner Roofing Company, with business headquarters at Henderson, North Carolina.

There has been no change in ownership or management of the business, which was established in 1920, the reason for making the change in name being to associate the name of the firm with the type of business it carries on.

The company makes a specialty of manufacturing and erecting metal cornices, skylights, ventilators and general sheet metal work.

Selling Farmer Sheet Metal on UTILITY BASIS of Ventilating System

Satisfactory Comfort Conditions in Barns Produce More Milk and Lessen Food Requirements of Cattle

By Professor A. J. Mack*

THIS is the fourth of a series of articles on Farm Ventilation. In previous articles the automatic roof ventilators and their possibilities, together with those factors which are incorporated in the more effective designs, were discussed. The discussion in one of the articles was in connection with the ventilation of storage spaces for fruits and vegetables on the farm. This and future articles will deal with ventilation as applied to farm buildings other than those used for fruit and vegetable storage purposes.

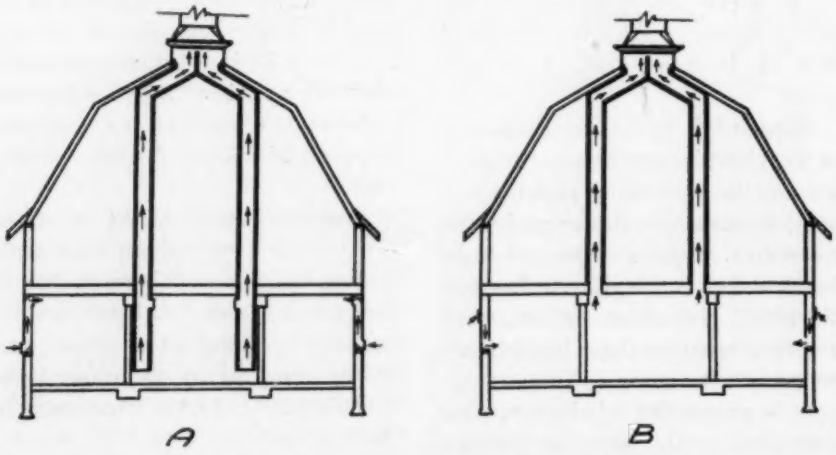


Figure 10. Ventilating flue arrangement. (A) The modified King system. (B) The Rutherford system. Note in A that the air enters the stable at the ceiling and foul air is removed from near the floor. In B fresh air enters near the floor and foul air is taken out at the ceiling. The modified King system has a small opening in the flue near the ceiling.

The dairy barn is selected for first consideration as it, of all farm buildings, has justly received the most attention in regard to ventilation. The principles involved in dairy barn ventilation may well be applied to other animal shelters.

Correct ventilation of a barn consists of keeping the air in proper condition for the health and comfort of the animals housed therein. Since it is a contributing factor in keeping the milk cows in good health, it also contributes to the good health of the human beings who consume the milk.

Plenty of good fresh air is beneficial in the prevention of tuberculosis, a disease to which dairy cows are subject. Authorities claim some cases of tuberculosis in humans are of bovine origin. This alone makes ventilation of inestimable value in dairy barns.

Each individual barn offers its own problem. A ventilating system which would be entirely satisfactory in one case would not necessarily be so in others. The location of the structure with reference to average temperatures, elevations, nearness to other buildings and also the nature of construction and condition of the structure are things which must be taken into account in every case.

When these have been duly considered, the system must be so designed that it not only takes care of the air requirements, but also takes care of humidity and temperature control which contribute to the comfort of the cows. Satisfactory comfort conditions result in increased milk production with reduced food consumption, as no unnecessary food is used up in the effort of cows to be comfortable.

A well-designed system will materially aid in the removal of the surplus moisture. This fact, in addition to maintaining correct moisture conditions, will contribute to the life of the barn by preventing condensation on the walls and ceiling. Such condensation results in mold and decay of the building materials.

A Kansas State Agricultural College experiment station bulletin states that a cow will breathe about 2,800 cubic feet of air per day. In order to maintain a satisfactory state of purity of the air it is necessary to maintain an air change rate of 56 cubic feet per minute per cow, the bulletin further states. This rate is considered sufficient to provide fresh air; to remove foul air, odors and other products of respiration among which are about 10 pounds of water per cow per day.

The system must make it possible to maintain for average dairy barn service a uniform temperature of approximately 50 degrees F. in the central sections of the country and 45 degrees to 50 degrees in the colder sections. The heat necessary is developed by the animals themselves. A 1,000-pound cow will give off sufficient heat in an hour to raise the temperature of approximately one and one-half tons of water one degree Fahrenheit. This is equivalent roughly to raising the temperature of six tons of air one degree. Aside from the velocity of the wind,

*This is the fourth of a series of articles on Farm Ventilation by Professor A. J. Mack of the Kansas State Agricultural College, Manhattan, Kansas. Note how facts on ventilation can be used by sheet metal contractor in selling farmer on ventilation for his dairy barns.

this heat provides the means of creating the air circulation through the barn ventilating system in the same manner as the flue gases in a chimney produce draft.

The construction of the shelter has much to do with the ventilating problem. In some of the warmer sections of the country barns are poorly constructed and cracks provide plenty of fresh air, but in the colder sections better construction is necessary. Tightly constructed, well-insulated barns are desirable in the very cold climates, and in some cases even the windows and doors are weather-stripped, in order that comfortable temperatures may be maintained.

In ventilation practice for dairy barns two general systems with modifications in each case are employed. These systems are known as the King and the Rutherford systems. A modification of the King system is shown in A and of the Rutherford system in B, figure 10. The systems differ in that the intake air of the King system enters near the ceiling and outtake air is taken off at the floor; whereas in the Rutherford system the intake air comes in at the floor and the outtake air leaves at the ceiling of the building.

The modified King system has a small outtake opening at the ceiling. In some cases the ducts are hinged at the ceiling for convenience or are omitted from the ceiling down and the air is removed at the ceiling as in the Rutherford system.

The outtake flues are usually 2 to 4 square feet in cross section and the number of such flues is dependent upon the number of cows to be housed. About 30 square inches of flue area are allowed per cow.

The intake flues are arranged along the wall, with the total area equal to or slightly greater than the total area of the outtake flues.

The outtake ducts should be as smooth and straight as possible for efficient service. They should be well insulated to prevent air cooling with resultant condensation. They are usually provided with dampers for control purposes.

The outtake ducts should be capped with automatic roof ventilators of ample size and of good design. The roof ventilator is much better than the ordinary cupola in that they are more efficient as air removers and the better designs are not subject to down drafts as cupolas often are. Sheet metal can be conveniently and extensively used in construction of dairy barn ventilating systems.

Figure 11 shows a popular arrangement of the intakes of a dairy barn ventilating system with reference to the windows. In this figure

Figure 11. Nine-light windows, placed in pairs with intake ventilating flue between, is a popular installation. Note the ventilating shield which deflects the air toward the ceiling when the window is tilted inward at the top, preventing direct draft on the cows. The window may be raised a few inches when in the open position so as to allow a direct draft for summer.

nine light windows are arranged in pairs, with the intake flues between them. The windows might well be designed to tilt inward at the top, as shown in the figure, to prevent draft directly on the cows. With such a plan sheet metal ventilating shields, as shown in figure 11, are used to direct the air currents upwards in the building.

This is a convenient arrangement for summer ventilation, which may also be improved by having doors divided into an upper and lower half so that the upper half may be left open.

The discussion of the proper ventilation of the dairy barn will be continued in the next article.

New Uses Found for Lead Coated Copper Sheets

The Baltimore Copper Mills, formerly a part of Baltimore Copper Smelting & Rolling Company and now a division of General Cable Corporation thru a recent merger, has developed for greater acid resisting qualities and architectural effect lead coated sheets in twelve standard finishes, viz.:

Light Coated Smooth, carrying about two pounds lead per 100 square feet. Supplied in antique color or natural finish, either soft or cold rolled.

Medium Coated Semi-Rough, carrying about twelve pounds lead per 100 square feet. Supplied in antique color or natural finish.

Heavy Coated Rough, carrying about twenty-five pounds lead per 100 square feet.

Wherever soot or coal deposits gather leaded copper should be used to prevent the action of the sulphur in the coal from attacking the copper. The same can be said of sulphurous or acid gases such as escape from vent pipes or around sewer openings.

It is a well-known fact that copper in itself is very susceptible to the action of acids. The free tannic acid in a new cedar shingle roof is

a good example and to counteract such actions a light lead coated copper is recommended for valleys, gutter and down spout.

Frequently the manufactured gas used in some cities is of such an analysis that the exhaust pipes used on gas water heaters last but a season, while lead coated copper on a job of this sort will last indefinitely.

The University of Illinois at Urbana has made use of large tonnages of lead coated copper for architectural effects, as well as:

City Hall, Pasadena, California.
Church of St. Basil, Chicago, Ill.
Church of St. Casimir, Baltimore, Md., and many other jobs.

Copper in continuous rolls for valley up to 20 inches wide is now available.

Developing a Pattern for Transforming Elbow from Square to Round

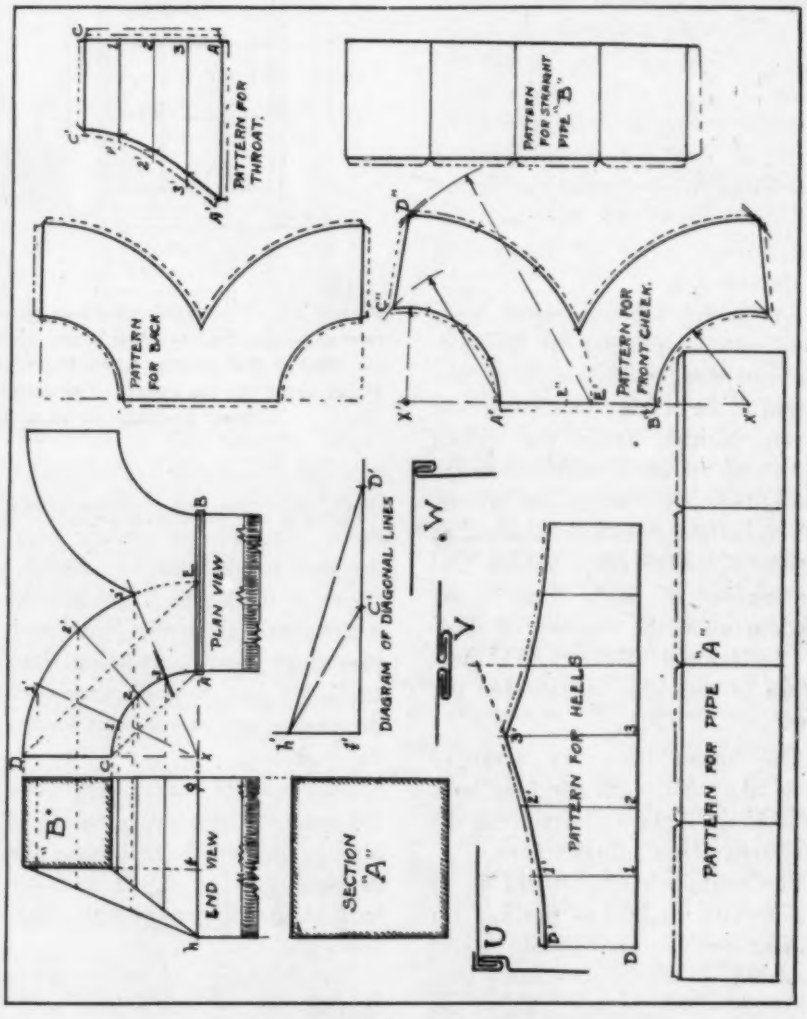
Such Work Is Often Met With by Furnace Men in Their Activities

By O. W. Kothe, Principal St. Louis Technical Institute

IN HEATING and ventilating work, where two elbows grow out of a main stack, the area taken by the two elbows is of course made equal to the area of the main stack. Because of this the branch pipes as at "B" are generally of a narrower width than the main stack "A." This offers some complication in laying out the wide side as well as the throat and heel. We here show a rather short way of getting at the approximate pattern for the front cheek, which is short and which is sufficiently accurate for such work. The correct way is to treat this cheek by triangulation, and where this is done a development will of course work out accurately. Any digression from the correct way always gives more or less approximate results; some of these are permissible, which we believe is alright in our case.

First draw the plan view of double elbows, giving the width of stack as A-B, and then designing the elbows, giving the radius as A-X and then the width of elbows as C-D. Next draw the end view, giving the section "B" and drawing to the point h. To the right we show pattern for back which is nothing more than plan view we produce. The straight pipe connecting onto these elbows is shown developed to right of drawing "B." The same holds true for pattern for large pipe "A" which is at the bottom of our drawing.

But to get at the front of cheek and the throat and heel we can divide the heel G-E into any number of equal parts or such as starting with 3′ and drawing lines to X, which also divides the throat in the same number of equal parts. From each of these points in throat and heel of plan project lines into end view—the dotted lines representing heel and solid lines the throat. To develop the pattern for throat we can take the girth from plan as C-1-2-3-A and setting it as C-A in pattern. Then draw stretchout lines and with dividers pick the throat lines of end view and set them in pattern as C′, 1-1′, 2-2′, etc. This



Developing Double Transforming Elbows

enables tracing the miter cut for the throat. The heel can be developed in much the same way by picking girth as D′-3 and setting it as D-3. Then developing the pattern as shown.

Now to get at the pattern for the cheek which sets on an incline and must be longer than pattern for the back, we can get the true lengths for the diagonal position by taking the offset h-t from end view and setting it as h′-t′. Then set dividers to distance A-C of plan and set as t′-C′. Then line C′-h′ is the true length in spanning the diagonal corners over the off-set. The same is true by picking line C-E and setting it as t′-D′. Then line D′-h′ is the true length for the diagonal line between these opposite corners.

Now to set out pattern we can draw a line as A′-D′ equal to the width of stack A-B. Then using true lengths h′-C′ and A′ in pattern as center, strike an arc as at C″. Next with dividers pick the true length h′-D′ and using E′ in pattern as center, strike an arc as at D″. Now set dividers to the width of section "B" as C-D and seek to establish a line of common connection between C″-D″ in pattern. This will give an average height so that it is a matter to locate the center X′ by a few trials.

Indianians Putting on Real Program at Annual Convention

Hotel Denison, Indianapolis, Will Be Used for Meeting, January 24 to 26 Everyone Invited

IN the conducting of their membership campaign, the Indiana Association of Sheet Metal and Warm Air Heating Contractors have been confronted with two peculiar factors. First, the prospective members cannot seem to realize that benefits await them far in excess of anything heretofore available. Second, a good many of them evidently feel that a personal invitation should be issued by a personal call from the president of the board of directors.

In order that the trade as a whole may understand the advantages of membership, and the sincerity of the invitation to join, the convention committee has decided to ask every sheet metal and every warm air heating contractor in the state to attend the convention sessions, whether he be an association member or not.

There may be a feeling in certain quarters that the association is for a certain select few and that others are not welcome, but such is not the fact. Every sheet metal or furnace contractor in the state is not only welcomed, but is wanted. The present administrations are especially trying to make the associations attractive and valuable to the small contractor. The man with a small shop, doing most or even all of his own work, is a large factor in shaping the ethics and practices of the trade as a whole, and the associations want him in; not to tell him what to do, but to get the benefit of his advice and support on matters affecting the entire trade.

Of course they want the big fellows too, but they have usually recognized the values of getting together and have supported association activity.

The failure of many contractors to believe that substantial benefits await them when they join, applies particularly to the insurance feature. It is not surprising that they should discount the astounding statements regarding insurance savings. Even President Waters, on being passed for approval, a tentative draft of the "advantages" being made up for print, remarked, "But haven't you made it too strong?" and it took a careful perusal of figures and facts to convince him that the membership can buy fire insurance from a sound, conservative and strictly top notch company for just one half of the regular rates, with other large savings on other kinds of insurance.

The convention committee believes that the average sheet metal and warm air heating contractor, being shown the advantages of association membership at the convention, and being able to check up on them through contact with others already enjoying them, will accept their reality. They hope that every one of them in Indiana will consider the invitation as personal to him, realizing that it is physically impossible to deliver personal verbal invitations, and will be on hand at the convention January 24-25-26, 1928, at the Denison Hotel, Indianapolis.

The Indiana Furmets have formulated most of their entertainment plans for the coming convention at Indianapolis, January 24-25-26, according to the entertainment committee consisting of R. S. Thompson, chairman, Fred Wilkening, John Henley, Roland Wilcox, Chas. Hall, Bob Kruse and Homer Selch.

The banquet will be held in the main dining room of the new Chamber of Commerce, said to be the finest Chamber of Commerce building in the world. Mr. Vinson, steward of the Chamber of Commerce, has prepared a menu especially for the banquet which he is sure will be a credit to him.

In conjunction with the banquet, which will be given on Thursday evening, January 26th, at 6:30, will be several entertainment features the nature of which the committee is not giving out at this writing. It is known, however, that there will be plenty of dancing for those who like it, a very little formal speaking, and some special entertainment.

The exhibit will be open on Tuesday and Wednesday evenings, as well as all three days, excepting during actual meeting time, and it is certain that the men will find much to interest and entertain them there.

The ladies will be well looked after by the ladies' committee, who have planned a luncheon for them at the Columbia Club on Wednesday noon, followed by a theatre party at the new Indiana Theatre. Thursday afternoon will be given over by the ladies to shopping.

*Facts on Soldering—Correct and Incorrect Methods of Flux and Soldering Iron Use**

Best Soldering Practice Demands That Flame Is Not Applied to Surface to Be Soldered

By P. C. Ripley

IN THE selection of a flux comes one of the most important factors in the determination of success or failure to soldering. The use of fluxes not suited to certain operations may cause trouble in your

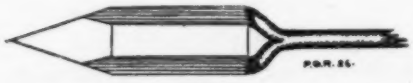


Figure 1. Example of a properly shaped iron point

products long after they have left your hands. This is apt to produce a doubt in the mind of the purchaser as to the integrity of your company or the quality of your merchandise. Flux is that substance whose duty is to dissolve the oxides which occur on the surface of all metals. When heated this substance dissolves the oxides and enables the solder, while molten, to enter the minute pores of the metal surface, effectually sealing them against a reoccurrence of oxidation. Fluxes range in character from very strong acids to very mild acid-bearing substances. For delicate electrical or radio use we must have a flux which is a poor conductor of electrical current, non-corrosive and which in its use will leave a residual matter that will have no tendency to collect moisture, dust or other foreign matter. *This is imperative.*

The radio industry has made a growth without a precedent in the manufacturing world. This has resulted in some rather unusual demands in the way of a flux for radio construction. The use of unskilled labor, ignorance on the manufacturers' part concerning suitable fluxes and their application, lack of manufacturing facilities and equipment, and the struggle to speed production to meet the demands of a clamoring market have, in some cases, prompted the use of fluxes entirely unsuited to radio construction. Some, to secure an increased production, have resorted to the use of the stronger fluxing agents, attempting to neutralize them with alkaline fluids. This fails, as the residual material is almost invariably corrosive and has a marked affinity for moisture. An alkaline residual is no better, for it, too, exerts a very marked corrosive action on the metal, so one by one these attempts have proven costly and futile. To attempt to use the stronger acids as fluxes in delicate electrical or radio construction is to invite disaster.

Still others have made efforts to

Figure 2. Example of a poorly shaped iron point

use the pastes or semi-viscous fluxes which are another form of compromise on the stronger acids. These contain a limited amount of the stronger fluxing agents suspended in some organic grease or wax, and the popular idea seems to be that the presence of this grease will prevent corrosive action. Unfortunately this is not true, as corrosion will develop even under this film of grease. Some manufacturers of these acid-bearing pastes have been so bold as to advertise them as being absolutely non-corrosive and suitable for delicate electrical and radio use. This is misleading and wrong, and a manufacturer in selecting a flux for the above uses will do well to regard pastes with suspicion.

Should he care to test the maker's claims regarding the corrosive action of his paste, all he has to do is to make an application of paste and solder in a soldering operation to a piece of nickel or German silver. Set this aside for thirty days without wiping and the result will be more or less startling. Of the many pastes which have come to our attention we have yet to test one that does not exert a corrosive action on both ferrous and non-ferrous metals. Please bear in mind that rosin does not produce corrosive action on these metals.

Pastes, no doubt, have a field for use, but not in the soldering of deliate electrical and radio joints.

Another detrimental feature in the use of pastes will result from the fact that the organic greases or waxes that are universally employed in their manufacture overrun when heated onto the insulating material of parts and wires. This deteriorates and breaks down the insulating qualities of these materials and at a later time will manifest this weakness in no uncertain manner. The active fluxing agents contained in pastes usually have a marked affinity for moisture. As these chlorides are distributed in a thin film over a considerable area adjacent to your soldering operation, they become an

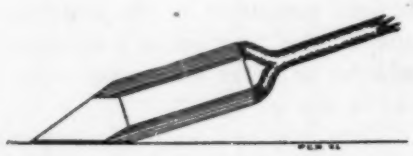


Figure 3. Proper contact between iron and work

active medium in promoting dielectric losses.

Grease also forms a very efficient collecting agency for dust and foreign matter which will result in fur-

*Article reprinted from pamphlet of Chicago Solder Company entitled, "Facts on Soldering," by P. C. Ripley.

ther losses through leakage. Some manufacturers employing paste as a fluxing medium, realizing its faults, attempt to remove this source of trouble by washing the joint with alcohol after the soldering operation. This is of doubtful value, as a close examination of the surfaces will disclose the fact that he has been successful only in spreading these destructive and troublesome agents over a greater area—usually into insulations and parts. To successfully remove these chlorides and greases will require a prohibitive amount of washing in suitable solvents.

The leading manufacturers and electrical engineers have spent large sums in experimental work and have conducted exhaustive researches to determine the best flux for delicate electrical and radio use. They are unanimous in pronouncing rosin the only safe and sure radio flux. Contrary to popular belief, rosin is acid, or rather contains acid in its natural structure, yet it is non-corrosive in use due to its physical characteristics. Rosin, the residual matter left after the distillation of one of the volatile oils from the concrete oleoresin obtained from the Pinus palustric Miller, is an abietic acid anhydride. This is a complex mixture of pentane, hexane, amylene, hexylene, toulene, xylene, cumene and also terebenthene and cymene. Its structure chemical components are materially changed when subjected to heat, light, age and atmospheric contact. The action of these forces will materially alter or destroy entirely the

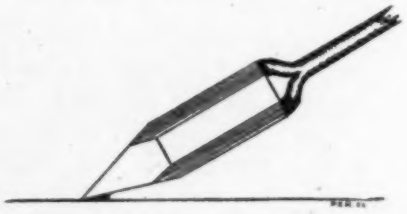


Figure 4. A correctly shaped iron, but poorly applied

good fluxing qualities of a rosin. Of the twelve standard grades of rosin as recognized by the United States Department of Agriculture, there are only a few which possess the necessary qualities that render rosin a good flux.

Here is where a rosin-cored solder will lead the user of a solder out of the difficulty in selecting the proper grade of this fluxing medium. The Chicago Solder Company, originators and world's largest manufacturers of flux-cored solder, carefully test all rosins which enter into their solders and use every precaution to maintain and insure the retention of its highest fluxing qualities. It is not advisable to use rosin-cored solder with an external flux. Rosin is not compatible with the stronger fluxing agents and through their use in conjunction with rosin-cored solder the corrosive action produced by them may be attributed to the rosin. Though rosin is slower in its fluxing action than the stronger acids, if the proper application of rosin-cored solder is

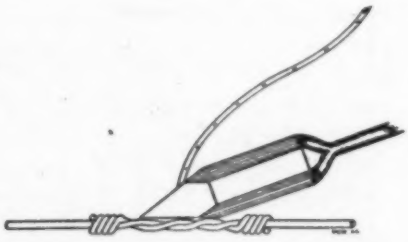


Figure 5. Incorrect method of solder application

made the activity is surprising on both copper and tin-plated metals.

So this complex mixture with its distinct advantages of being a poor conductor, non-corrosive and its residual exhibiting no tendency to gather moisture, dust or foreign matter, gives us our best and safest electrical and radio flux.

Solders

Solder is an alloy, composed usually of the two metals, tin and lead. These two metals are combined in variable proportions which reflect certain characteristics in the alloy and are the controlling factor in the selection of solders for specific purposes. One of the vagaries of nature is manifested in solder, for it possesses a lower melting point than either of its component metals. Other metals may be added which will bring about a still lower melting point, but in doing this we effectually destroy some of the desirable attributes which tin and lead mixtures manifest. So, except in extreme cases, we may as well dismiss from our consideration solders of a melting point lower than are

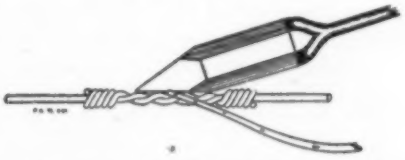


Figure 6. Cored solder properly applied

obtainable in the ordinary tin and lead combinations.

In the selection and purchase of your solder requirements insist on the product of a reputable manufacturer, for he takes a pride in his wares and will supply you with an honestly labeled product. Beware of cheap solders, for they are often made of reclaimed or scrap metals and contain impurities as well as metals other than tin or lead. These may have the effect of rendering the alloy brittle, detract from its flowing quality, raise the melting point, or give an increased resistance to the flow of your electrical current.

In the proportioning of the amounts of tin and lead in our solders we secure certain peculiar behaviors in its physical character, both when heated and when cold. A very high tin content in solder renders it crystalline, hard and easy to fracture, although it will be ductile. A very high percentage of lead will result in a soft solder which exhibits a somewhat lower tensile strength and a greater ductility. At one point in the proportioning of tin and lead an alloy results where atom for atom, tin and lead unite, giving a eutectic mixture. When 37 per cent of lead is fused with 63 per cent of tin, a solder results that is either all fluid or all solid when heated, as there exists no plastic or mushy stage in its change from one state to the other. No matter which you increase, the percentage of the tin or the lead from this point, the result will be a plastic or mushy state in changing from fluid to solid, or vice versa. Practically all commercial solders are non-eutectic

alloys, their proportions being governed by the resulting characteristics and the work requirements. The more common mixtures in use being 40/60, 45/55 and 50/50.

Our company makes use of virgin metals only in the manufacture of their rosin-cored solder and all possible precaution is exercised to insure the purchaser of their solders of a uniform and dependable product. Manufacturers and solder users will find this a most adaptable form in which to secure the two essentials for successful soldering. Sizes in which this solder may be obtained range from 240 thousandths outside diameter to 40 thousandths, with two core sizes of flux. This enables the user to secure the proper size in both diameter and flux content to insure flux control for his manufacturing needs. The larger core is indicated by the stock number sixty-six (66), while the smaller, containing less rosin, is known as number fifty (50).

The standard or most popular size of rosin-cored solder is 92 thousandths outside diameter and carries a number 66 core. The largest sizes from 240 to 160 thousandths are cut in 18-inch sticks and are packed in five-pound boxes. The intermediate sizes may be secured in one-pound cartons, 1, 5, 10 and 20-pound spools, as well as in 18-inch sticks in five-pound boxes. The smaller sizes being packed in 1, 5 and 10-pound spools. These packages furnish convenient units for the handling of solders in production. All spools are non-returnable, eliminating the bother of spool collection and return. The solder itself may be secured in any mixture of alloy, core size, and in both plain and crimped finish. Manufacturers wishing cored solder prepared to their own engineering department specifications will find it to their benefit to submit these specifications direct to the Chicago Solder Company, 4201 Wrightwood Avenue, Chicago, Illinois, U. S. A.

Rosin-cored solder furnishes the user of it with a means of accomplishing neat and substantial work with the distinct advantage of being the one, safe fluxing agent for electrical use. As the solder is used the proper amount of flux is released and flows onto the work, saving time, labor and materials, and no manufacturer in the electrical field should overlook the possibilities of rosin-cored solder in accomplishing these ends.

Soldering Equipment

In soldering tools or equipment we have three, more or less, distinct types with which to bring our work

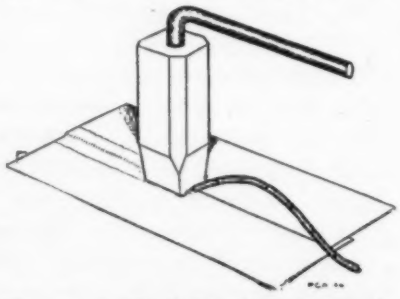


Fig. 7. A Desirable Iron Shape for Seam Work and Correct Solder Application

to a temperature where our solder will flow. A torch throwing an open flame directly on the work to be soldered; the conventional type of soldering iron which absorbs heat from some source and acts as a conveying agent to the surfaces to be soldered, and the electrically heated iron, which has two principal forms.

The torch is more or less impractical for universal use, as it presents quite a problem to confine the flame to the part or area to be soldered without damage to the surrounding parts. This is a matter of considerable gravity should these be inflammable or subject to damage from high temperature. By the employment of suitable jigs and shields, however, it may solve some very difficult problems in unit assembly. Care must be exercised to prevent excessive oxidation or carbonization of the work, as rosin is too mild in character to dissolve a heavy film of either. The best practice demands that we *do not apply flame directly to surface to be soldered.*

The ordinary iron with which we are all more or less familiar offers the most inexpensive and efficient means of heating our work and also proves very flexible in its adaption to manufacturing conditions. The application of the hand iron of the common type offers a handicap on certain types of soldering operations as one of the operator's hands must be utilized in the manipulation of the iron. A still further loss of time in the use of this type iron is caused by the frequent changes necessary as it exhausts its contained heat. This may be overcome by the use of a gas flame supplying the heat directly to the iron head during its operation. One adaption of this form is a simple bar of copper mounted on the bench with a suitable standard. An open flame is in continuous contact with one end of the bar which conducts this heat to the object to be soldered when it is placed in contact at the other end. This is simply the conduction of heat from the flame to the work, utilizing the medium of the copper bar. In the above outlined method we have a very convenient and continuous means of unit assembly, as it leaves both of the operator's hands free for manipulation of solder and work.

Variations of this type may incorporate two or more of these irons mounted on a movable head, operated by the use of a foot pedal. Its use should be accompanied with necessary jigs to hold work. This device is applicable to spot soldering in unit assembly, as time loss is usually traceable to the time required for heat transmission. Through its use no greater time will be required to bring four units to a temperature for soldering than would be consumed by bringing one to this point.

The electrical iron offers two forms with which to utilize electrical energy in heating our work. One carries a resistant unit in its body which generates heat and is delivered to the work through the conducting medium of a copper point or head. While the other makes use of the high resistance, graphite carbon imposes on the flow of electrical current. The first described must be left continuously on the circuit while in use, while the latter requires current only when in actual

contact with the work to be soldered. The merits of the later method are so apparent that there has been considerable activity among the manufacturers of late in the utilization of this method of heat generation. The application of the carbon resistant type may be successfully made in a hand tool by carrying both positive and negative electrodes in such a manner that both are brought in contact with the work at the same time

Either of the electrical methods will prove a fruitful source of time saving if the proper application is secured, and all manufacturers of products utilizing solder should give these applications serious consideration when designing jigs and layouts.

Whatever the type of iron you select, it must have capacity adequate for the work upon which it will be employed. Rosin joints or insecurely soldered connections are often traceable to the lack of capacity in soldering tools. You will be far more successful in using a heavy iron on light work than you will by attempting to use a light iron on heavy work. The motive in the employment of a soldering iron is to convey heat to the object to be soldered. When these surfaces to be joined have absorbed enough heat to melt solder freely, then and then only can we secure a properly soldered connection.

Application of Solders and Flux

In the successful use of solder we must bear this one important, basic principle in mind: that our work must be brought to a temperature to flow or melt solder. Accomplishing this and with the aid of proper flux and correctly made solder, we're sure to achieve a satisfactory result.

Failures to secure a temperature adequate to soldering demands are often traceable to the lack of heat-conducting surface in our heat transmitting devices or carelessness on the part of the operator in neglecting to properly present this heat-conducting surface to the work for heat transmission. As a simple illustration of a correctly shaped point we will make use of a conventional, externally heated iron. In Figure 1 we have a blunt, heavy point that can deliver its heat with sufficient rapidity to overcome radiation in the work, while in Fig. 2 the iron with its slender and longer point there is danger that it will not be able to overcome this trouble.

To further illustrate how careless handling of soldering tools may defeat our best laid plans, look at Fig. 3 and you will note that the entire iron face is in contact with the work. Fig. 4 gives some idea of what may happen with the same correctly shaped iron in the hands of a careless operator. The iron in Fig. 3 is so positioned that the transmission of heat may be carried on with all rapidity, whereas in Fig. 4 there is only a limited contact for this heat delivery.

Insecure joints, commonly termed rosin joints, are often the direct result of the foregoing misapplication of soldering tools, and form a never ending source of trouble for the manufacturer. As a further aid in securing a rapid delivery of heat to our work we must keep all soldering iron faces solder coated. Oxides, not only being poor electrical conductors, are also poor transmitters of heat, and a crust or film of oxide on our iron face will destroy its efficiency in heat delivery. By solder coating our iron's working faces we accomplish a means of enlisting the natural law of capillary attraction, to assist us in heat conduction. Molten solder when in contact with a tinned iron face is distinctly adhesive, while an iron whose faces are oxide coated, on contact with molten solder exhibits an entirely different phenomenon, that of cohesiveness. The webbing of the solder between the solder-coated face of the iron and the work will take care of all irregularities in the two surfaces, giving us a maximum contact. If this coating of solder becomes burned or oxidized by overheating the iron, it immediately manifests the fact by a slowness in heat transmission. Before any success will attend the use of a tool in this condition it must have the working faces re-coated with solder. This is best accomplished by heating the iron and cleaning the faces with a file. When the faces show clean and bright apply rosin-cored solder until they become solder coated and adhesive to the molten metal. Never use sal ammoniac to clean or tin the iron, as some of this material may be carried to your work and cause trouble through its corrosive and conductive properties.

When using rosin-cored solder remember that the rosin must come in actual contact with the joint to be soldered. It will then be able to dissolve the oxides and float them from the surface to be soldered. Rosin is disintegrated with heat, so its active fluxing life is limited by the length of time and the amount of temperature to which it is subjected in the soldering operation. Do not apply solder and flux to the iron; apply it directly to the joint to be soldered after it has attained a temperature where it will melt and flow the solder. We are not interested in soldering the iron or in melting flux on it; what we want to accomplish is a securely soldered joint, and the best and easiest way to secure it is to apply our rosin-cored solder directly to the heated surfaces. By referring to Fig. 5 you will see an example of an incorrect application of cored solder. Here the solder is being melted on the upper face of the iron, forcing flux and solder to run around the entire iron point before it can reach its objective. This dissipates the active deoxidizing agent of your flux before it has an opportunity to clean the surface upon which we wish the solder to adhere. On examination of Fig. 6 you will note that instead of striking the solder on the sides or upper face of the iron it is touched directly at the junction of the work and the contact face of the iron. This allows the flux to be expelled directly on the heated surface which we wish to clean and solder, and furnishes us with the ideal application. After the solder and flux has melted do not remove the iron until the solder is observed to flow freely and

evenly over the surfaces where we desire adhesion. The failure of the solder to behave in this manner will indicate one or both of the following faults: work insufficiently heated or work's surfaces too heavily oxidized and dirty to respond to the fluxing power of rosin. Those of you who insist on picking up solder and flux on the iron and carrying these to the work to be soldered must remember that the physical characteristics of rosin are such as to demand a speedy execution of the operation. In collecting the solder and flux on your iron from your spool of rosin-cored solder, always do so with a downward stroke so that the rosin will not have to run around the entire body of the point before reaching a position where it will make a contact with the work. Carry the iron with the point deflected downward so that the solder and the flux are concentrated on the under side near the point and not on the body of the iron. The operator will note that the instant the rosin comes in contact with a hot iron a film of white smoke is produced. The moment this ceases disintegration is complete, and the residual matter of the rosin still clinging to the iron has no fluxing power whatever. The practice of carrying solder and flux to the work on the point of a heated iron should be discouraged. It has no place in the production methods of conscientious manufacturers.

As a substitute for this method of carrying the solder and flux to the work on our iron point, we would suggest solder coating the two surfaces to be joined first, then bring them into contact and complete the operation by applying heat with our iron. There is usually enough active rosin adhering to the surfaces to successfully flux the work. Rosin is being called upon to perform as a safe fluxing medium, more and more, with the result that it is now being used on seam work quite extensively. As a suggestion to secure the best results in this type of construction it is advisable o use an iron of the type illustrated in Fig. 7. An iron of this shape provides a way for the workman to apply his rosin-cored solder in advance of the iron travel, at the junction of the seam and iron contact. This will permit the flux to penetrate the recess of the seam and the solder will follow as the iron passes over the surface.

The operator should draw the iron slowly and steadily toward himself, applying small amounts of solder as he progresses. This method assures a smooth, uniform and continuous solder bond. Never draw the iron with jerks, back and forth, or raise from the soldering surface. Your impression may be that you are accomplishing a greater speed in this manner, but you are really losing time. Aside from slowing up your operation, your result will be a ragged, weak and unworkmanlike seam, showing a distressing lack of uniformity. Extremely deep seams requiring sweating are most easily accomplished by a previous tinning of the soldering surfaces of your metal before their formation into the seam. Rosin exercises its fastest fluxing action on tin and copper, or parts properly plated with these metals. This is due to the abietic acid's greater capacity as a solvent for the oxides of these metals as compared to the oxides of the other metals. Cheap, electro tin-plated contacts and wires are a questionable relief to secure a greater speed in soldering. Hot tinned parts are more desirable. Parts presenting nickel-plated or oxidized brass soldering contacts are a sure retardant in securing a maximum soldering production, as their oxides do not respond to the rosin flux readily. They can be soldered successfully using rosin as a fluxing medium, but require a skilled operative and a great deal of patience. Enameled parts or wires must be thoroughly cleaned of their insulating materials at soldering points before any effort is made to solder them. This also applies to any other form of insulation, such as rubber, varnish, shellac, silk or cotton. The removal of insulations, oxides or sulphates is best accomplished mechanically, as chemical cleaners may produce reactions which will prove destructive to your product's life.

Through the use of suitable jigs and properly formed bus bar connections a higher grade of workmanship is obtained and eliminates the necessity for the third hand in assembly. We cannot condemn too strongly the practice of allowing operatives to hold one part of the work in their hand while joining it to another with solder. The great fault lies in their inability to hold the part steady at the critical period when the solder passes from its fluid stage to hardness. The slightest tremor at that moment of abutted parts will result in a partially fractured joint which may not manifest its weakness at once, but at a later time give way under strain. Remember that the correct way to form a joint for the control of electrical energy is to make it mechanically secure and electrically conductive first, then solder bond. *Do not blame the solder or the flux, and do not blame the workman, as these results are beyond the control of either.* Try jigs for holding the work, formed connections, careful thought in designing, and the most accessible arrangement of soldered connections, with materials which respond readily to the fluxing powers of rosin, and an increased production with a material saving is sure to be your reward. You will find that if these helps are adopted, rosin-cored solder will furnish the two essential materials for soldering in a form adaptable to *increased quantity production.*

American Artisan For Sale Ads Dispose of Your Used Tools

To American Artisan:

Please discontinue my advertisement offering for sale a used double truss cornice brake, as I have already sold the brake. I also want to say that we had many inquiries, which goes to show that your paper is a live proposition. Thank you many times over for your help.

Jacob Brenner.

Fond Du Lac, Wis.

Zinc Producers Prepare to Form World Syndicate

Under the copyright line of the New York Tribune, Inc., the following information regarding the preparations for the formation of a world syndicate of zinc producers appeared:

"A conference will be held in Germany this month to draw up a basis for an international zinc syndicate, it was reported in London January 2. Producers in Britain, Germany, Belgium and Poland are said to be engaged in the present negotiations, with American producers to follow.

"The Evening Standard says that the discussions, after having proceeded for some months, now have reached a stage highly satisfactory to those taking part, and recalls that the previous negotiations for the formation of an international cartel failed because of the hostility of American zinc producers who control a large proportion of the world's supplies. However, the newspaper stated that the leading American firms have agreed to the present proposals which include a 5 per cent restriction on output, and predicted that if the syndicate were formed the world price of this metal would rise."

Pexto Has New Universal Combination Rotary Bench Machine

The Peck, Stow & Wilcox Company of Southington, Connecticut, has just issued a well-illustrated booklet, No. 45, which contains many interesting features in connection with their new Universal combination rotary bench machine.

Claims made for this machine are that, without the sacrifice of any features characteristic of non-interchangeable bench machines, so commonly in use, this new machine will take care of such operations as turning, wiring, burring and elbow edging with a nicety.

The Machine

The rolls are interchangeable, the machine well constructed, embodying many essential operating features as lacking in combination machines attempted heretofore. It will be extensively employed in the future, whether one machine with a combination of rolls will suit the needs of the user or where separate machines are to be preferred for individual operations.

The booklet the company offers, telling the story of this addition to their extensive line, well illustrates all the advantages in favor of this particular combination machine, and with its introduciton it is predicted non-interchangeable bench machines, so well known to the mechanic, in due time will pass out of the picture.

This machine is made up under No. 1544 as a combination with four pairs of rolls; viz., thin turning, thick turning, wiring and burring with a spare upper burring roll, including standard and spanner wrench. Elbow edging rolls can also be supplied when required.

The same machine will also be put up as burring, turning, wiring or elbow edging machines, respectively, for the benefit of the user who might prefer several machines to be used on the bench for individual operations. However, the rolls being interchangeable, they can be used in connection with as many machines as might be employed in the shop.

Probably no other machines used in the craft of the sheet metal worker are better known than bench rotary machines. Consequently, this announcement is one of concern and interest, and it will prove profitably advantageous for both user and dealer to post themselves concerning this drastic change as brought about in bench machine design and construction.

Close Up of Machine

National Heatcraft Institute to Offer Condensed Merchandising Course

The National Heatcraft Institute, conducted under the direct supervision of John S. Walker, Peoria, Illinois, has an important announcement to make to warm air heating system installers who are interested in increasing their knowledge of salesmanship.

A new merchandising course has been arranged for resident students. The course is condensed to four weeks and is repeated three times, so that all furnace men desiring to go to Peoria for the four weeks' course can arrange to do so.

The first course will commence January 9 and will continue to February 4; the second begins February 6 and runs to March 3; the third course opens March 5 and continues to March 31.

In these courses most of the time will be given over to furnace salesmanship, but considerable information on advertising will also be given.

Full details can be secured by writing the National Heatcraft Institute, 202 Main Street, Peoria, Illinois. The tuition per week is exceptionally reasonable, and the month's residence in Peoria will greatly aid those furnace men who really want to learn more about the science of selling furnaces.

Random Notes and Sketches
By Sidney Arnold

"The essence of humor is sensibility; warm, tender fellow-feeling with all forms of existence."—Carlyle.

I received a very beautiful Christmas card among others from Milwaukee. It was entitled, "The Stork Won!" The illustration on the card was this, in the foreground there appeared a man—a doctor—desperately trying to get somewhere in a buggy drawn by a muchly urged horse. In the air appeared old Santa Claus very much in haste, but ahead of them all was Mr. Stork sailing through the air at a great rate of speed with his precious burden. Here's what the card said on the inside, " 'Twas a close race, but the stork won . . . with the approach of dawn, on Friday, December 23, at the Deaconess Hospital . . . and now our seven-pound daughter, Jean Antoinette Sigwalt, lustily joins us in wishing you a Merry Christmas and Happy New Year." Signed Antoinette and Harold Sigwalt. Mr. Sigwalt, as everyone knows, is with the Milwaukee Corrugating Company, Milwaukee. Congratulations are in order.

* * *

There's been a lot of disputation down Indiana way about who are the superior bowlers, the sheet metal contractors of the Fur-Mets. The matter was definitely settled the other night, however, when two members of the Fur-Mets trimmed two members of the contractors. The accompanying diagram, which is a bowler's score sheet, gives the evidence in black and white. The initials appearing on the score sheet are as follows: G. E. is George Erdheim, Gary; W. G. is Walter Grote of the Pripps Company, Gary; H. J. is Harry R. Jones, Indianapolis; F. M. is Frank Michaels, Tanner & Company, Indianapolis.

* * *

The accompanying illustration is that of William G. Laffin, whose proud but bald (that is, I mean almost bald) papa is William P. Laffin of the Charles Johnson Company, Peoria, Illinois. I don't know what Bill, Sr., does during these cold days and nights to keep his head warm, but one glance at the photo will show that Billie, Jr., has no worries on that score. I think little Billie has just about reached the junior drum major age, but the only thing missing from the picture to make it complete is the high hat. And I'm not sure whether Bill, Sr., has relinquished that as yet or not. Anyway, Bill, I enjoyed my visit at your place of business the other day very much indeed, also the company you keep.

William G. Laffin

* * *

Sagged in the Middle

"Is it true that you've severed your engagement with Miss Overmarte?" queried the inquisitive friend.

The man shook his head.

"No," he replied, "I didn't break it off."

"Oh! She broke it off?"

"No," was the answer again.

"But it is broken off, isn't it?" persisted the curious one.

"Oh, yes," explained the moody one, with delicacy. "She told me what her milliner's yearly bill was, and I told her how much a week I got. Then our engagement just sagged in the middle and gently dissolved."

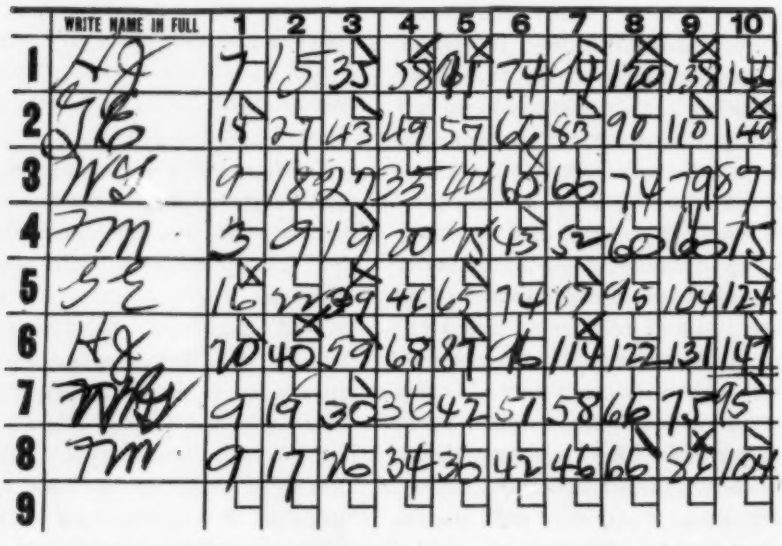
* * *

Not So Cool After All

A few minutes after an alarm of fire was given in a hotel, Frank Reinke, Madison, Wisconsin, a guest, joined the group that was watching the fire, and chaffed them on their apparent excitement.

"There was nothing to be excited about," he said. "I took my time about dressing, lighted a cigarette, didn't like the knot in my necktie, so tied it over again—that's how cool I was."

"Fine," one of his friends remarked, "but why haven't you your trousers on?"



No, This Is Not a Chinese Laundry Check. It Is a Bowling Score Showing How the Fur-Mets Beat the Contractors.

Standard Furnace Ordinance Incorporating 4th Edition of Standard Code

Prepared by National Warm Air Heating and Ventilating Association

THE following is the Standard Code Ordinance Form as it has been prepared and issued by the National Warm Air Heating and Ventilating Association. It incorporates the fourth edition of the Standard Code.

STANDARD ORDINANCE FORM

Based on "THE STANDARD Code" For adoption by any City, Town or Incorporated Village.

Prepared by The Joint Code Committee.

ORDINANCE

Ordinance No....., to regulate the installation of gravity warm air heating systems in residences or other buildings.

The provisions of this Ordinance shall be held to be the minimum requirements adopted for the protection of health, welfare, sanitation and safety of the community and for the protection of the ultimate purchaser or user of the heating plant.

Gravity Warm Air Heating Systems, to which this ordinance refers, shall consist of one or more Warm Air Furnaces, enclosed within casings, together with necessary appurtenances thereto, consisting of warm air pipes and fittings, cold air or recirculating pipes, ducts, boxes and fittings, smoke pipe and fittings, registers, borders, faces and grilles, the same being intended for heating buildings in which they may be installed.

Be it ordained by the council of the City of.....
State of.....

SECTION I

In all cases where the warm air furnaces and appurtenances thereto are to be installed or constructed in the city of..... the sizes of the warm air pipes, wall stacks, fittings, registers and furnaces for use in residences shall be determined as follows:

Paragraph 1. Each first floor room.
Divide the square feet of exposed glass and doors (full casement opening) by 12.
Divide the square feet of net exposed wall by factor in Table A.
Divide the cubic contents by 800.
Add together the above and multiply by 9. The result is the cross sectional area of the basement warm air pipe in square inches.

Paragraph 2. Each second floor room.
Divide the square feet of exposed glass and doors (full casement opening) by 12.
Divide the square feet of net exposed wall by factor in Table A.
Divide the cubic contents by 800.
Add together the above and multiply by 6. The result is the cross sectional area of the basement warm air pipe in square inches.

Paragraph 3. Each third floor room.
Divide the square feet of exposed glass and doors (full casement opening) by 12.
Divide the square feet of net exposed wall by factor in Table A.
Divide the cubic contents by 800.
Add together the above and multiply by 5. The result is the cross sectional area of the basement warm air pipe in square inches.

Paragraph 4. (a) All rooms with attic spaces immediately above, full ceiling areas shall be taken into account, using Table A.

(b) Floors over unexcavated spaces separated from furnace room by solid wall shall be figured as 50% exposed wall and fully exposed floors shall be figured as 100% exposed wall.

(c) For rooms having unusual exposure, ordinarily north, northeast and northwest, add 15% to pipe area. For east and west exposure, add 10%.

(d) The value of 800 (used in cubic contents) is for an estimated air change of one room volume per hour. To provide for 1½ room volume use the figure 600. If for 2 room volumes use the figure 400.

(e) Use no basement warm air pipe less than 8 inches in diameter. If a basement warm air pipe figures greater area than the nearest commercial size then the nearest commercial size may be used, provided, however, that the total pipe area for the entire building shall, in no case, be less than the total requirements according to Paragraphs 1, 2, 3.

(f) The above values are for determining basement warm air pipe areas, where these pipes are run comparatively straight and not over 12 feet in length.

(g) When war air pipes exceed 12 feet in length or have more than two 70 degree turns, at least one commercial size larger pipe must be used.

(h) Transitions from warm air pipes to stacks or register heads shall be made with a well designed elbow or boot, and all first floor fittings and connections shall maintain a free area equal to the round basement pipe leading to them.

Table A

(The factor 60 used in the example following Table A, is for buildings constructed as in item No. 1. When other types of walls are used substitute the appropriate factor as given below.)

No. 1. Frame wall constructed of siding, paper, sheathing, studding, lath and plaster..... 60

No. 2. Frame wall constructed of siding or stucco direct to sheathing (no paper), lath and plaster 52

No. 3. 9″ Brick wall (no plaster) 40
No. 4. 9″ Brick wall plastered one side 48
No. 5. 9″ Brick wall, air space, furred and plastered 65
No. 6. 13″ Brick wall, no plaster 53
No. 7. 13″ Brick wall, plastered one side..... 57
No. 8. 13″ Brick wall, air space, furred and plastered 75
No. 9. 4″ Brick, 4″ hollow tile, plastered 55
No. 10. 4″ Brick, paper sheathing, studding, lath and plaster (brick veneer) 68
No. 11. 8″ Hollow tile, stucco and plaster 67
No. 12. 8″ Hollow tile, stucco, furred and plastered. 90

ROOFS

No. 13. 1″ T. & G. sheeting, tar and gravel..... 48
No. 14. 1″ T. & G. sheeting and composition roof 40
No. 15. 1″ T. & G. sheeting and tin 24
No. 16. Corrugated iron on strips 9.3

CEILINGS

No. 17. Lath and plaster without floor above..... 50
No. 18. Lath and plaster with tight floor above.... 90
No. 19. Metal without floor above 40
No. 20. Metal with tight floor above 70

Basis of Working Rules

(a) These formulae are for 70 degree temperature difference (outside temperature zero, inside temperature 70 degree Fahrenheit). When temperature difference is more than 70 degrees, add 1½% per degree to final figures. When temperature difference is less than 70 degrees, deduct 1½% per degree from final figures.

(b) The values as given in Table A for use in the working rules, Section 1, paragraphs 1, 2 and 3 are derived as follows:

Example

The factor 60 in Table A, Item No. 1, is based upon a co-efficient of heat transmission of 0.23 B.t.u. per square foot per degree difference per hour, thus:

$$\frac{W \times 0.23 \times 70}{111} = \text{sq. in. first}$$

floor leader to compensate for the heat loss through walls only. In this, W = net area outside wall in sq. ft.; 0.23 = coefficient of transmission in B.t.u. per sq. ft. per degree difference per hour.; 70 = difference in temperature of air on inside and outside of wall; 111 = heat carrying capacity of one square inch of first floor leader pipe for a register temperature of 175° F. Reduced to its simplest approximate form this is $\frac{W \times 9}{60}$.

The values in Table A for the different types of walls were obtained by substitution of proper coefficient of heat transmission instead of 0.23 in the above formula.

Likewise substitute 167 for second floor and 200 for third floor in place of 111.

Method of Determining Size of Wall Stacks

Paragraph 5. First floor rooms. Wall stacks shall have same area as first floor basement pipes, paragraph 1.

Paragraph 6. Second floor rooms. Wall stacks shall be *not less than* 70% of basement pipe area as determined in Paragraph 2.

Paragraph 7. Third floor rooms. Wall stacks shall be *not less than* 70% of basement pipe area as determined Paragraph 3.

Paragraph 8. Where two or more rooms are heated from the same basement pipe and stack, the area of such basement pipe and stack shall equal the combined areas as determined by Paragraphs 1, 2, and 3.

To Determine Size of Warm Air Registers

Paragraph 9. All registers shall have a total free area of opening equal to or greater than the warm air pipe requirements for the room to be served.

Method of Determining Size of Furnace

Paragraph 10. (a) Add together the warm air pipe areas (expressed in square inches) necessary for heating the building, as determined by the foregoing *calculated* requirements, Section 1, Paragraphs 1, 2, 3 and 4, and install a furnace, rated by the following formula:

Furnace Rating Formula

$$L = 1.75\ G\ [1 + 0.02\ (R - 20)]$$

L = square inches of warm air pipe connected to the furnace as calculated.

G = grate area in square inches; the area of the fire pot at the grate level, its most restricted area.

R = ratio of heating surface area to grate area; 1.75 = constant based upon the results obtained in the Association Research on a furnace having 20 square feet of heating surface for each square foot of grate, and including factors for:

E = efficiency of heater;
C = combustion rate;
F = calorific value of fuel;
0.75 = percentage of heat available at registers;
136 = B.t.u. delivering value of one square inch of warm air pipe, assuming half of the heat is sent to each floor. This value is based on an operating temperature of 175° F. at the register.

The formula allows 1.75 square inches of warm air pipe area for each square inch of grate area, for the furnace having a ratio of heating surface to grate surface of 20 to 1. For furnaces having other ratios of heating surfaces to grate surface, it adds 2 per cent or deducts 2 per cent for each unit above or below a ratio of 20.

Where certified ratings of warm air furnaces by the manufacturers thereof, are not filed with the Building Inspection Department in accordance with the above formula, then the capacities of such furnaces shall be determined by multiplying

the square inches of grate area by 1.5.

Application:

	No. 1 Positive Correction	No. 2 No Correction	No. 3 Negative Correction
Grate area, sq. in. ..... =	346	346	346
Heating surface area, sq. in... =	7540	6920	5665
Ratio heating surface area to grate area ..... =	21.8 to 1	20.0 to 1	16.4 to 1
R — 20 ..... =	1.8	0.0	—3.6
Correction per cent ..... =	3.6	0.0	—7.2
1.75 G ..... =	606	606	606
L = 1.75 G + correction..... =	628	606	562

Provided that in second floor duplex, flats or apartments where separate heating plants are used, add 50% to the total net *calculated* areas. This represents the required warm air pipe capacity in square inches of the furnace for the second floor.

(c) Every Warm air furnace shall be equipped with a water pan or other humidifying device.

Gas or Oil Fired Furnace

In the application of a gas- or oil-fired furnace to any gravity warm air heating system, any variation from the requirements of this Ordinance shall apply only to the furnace itself.

SECTION II

Location of Furnace

Paragraph 1. The furnace shall be located so as to equalize the length of the warm air pipes as nearly as possible, giving preference to main living rooms and halls.

Foundation

Paragraph 2. (a) A furnace foundation of brick, cement or other incombustible material must be provided. Said foundation shall extend at least fifteen inches (15″) at rear and sides of furnace casing, and at least thirty-six inches (36″) in front of furnace casing. Said foundation to be level, and no furnace shall be set in any building without such foundation.

(b) Where it is necessary to place a heater on a combustible floor, not less than four inches (4″) of hollow tile shall be used in every instance, having joints matched in such a way that air passage will be free from side to side, so that at no time will the removal of ashes or the handling of coal close up these openings. Such foundation shall be constructed upon, and covered with continuous sheet metal plates, of not less than No. 24 gauge metal, having all joints substantially riveted or double seamed and the bottom sheet to have the edges turned up at least one inch. This floor covering shall extend under the whole of the fire box and ash pit of the furnace and outwardly not less than two feet on all sides.

Assembling of Furnace

Paragraph 3. (a) The base ring of any portable warm air furnace shall be cemented to the foundation, and cement flushed in around the back of the base ring, making an air-tight joint. The furnace shall be assembled plumb and level and in a workmanlike manner. All sections and joints shall be properly fitted. Joints requiring cement shall be well filled and all bolts shall be drawn up tightly.

Casings

Paragraph 4. (a) Warm air furnaces shall be enclosed in metal casings or walls of brick, tile or concrete.

(b) Portable. Sheet metal casings including casing tops or bonnet shall be made of galvanized sheets, not lighter than 26-U. S. Standard Gauge. They shall fit the castings and casing rings closely, so as to be dust tight, and shall be securely fastened to the front. The casing shall be lined from the upper casing ring down to a line on a level with the grate.

(c) When side collars are used the casing top or bonnet must be of sufficient height so that the largest warm air pipe can be taken from side without ovaling. In no case shall a distance less than eight inches (8″) be maintained between the top of any furnace and the center of the bonnet top.

(d) Any furnace, the casing top of which shall come within twelve inches (12″) of a combustible floor, ceiling or joist, shall be protected by a metal shield, extending not less than eighteen inches (18″) beyond the casing of said furnace. This shield shall be suspended at least two inches below wood work, allowing free air space between shield and woodwork. No furnace casing or top, coming nearer than six inches (6″) of ceiling or joists shall be allowed in any case. All metal casing tops shall be insulated with an air space or covered with magnesia, asbestos boiler covering or sand.

(e) Openings for side casing collars shall be cut into the casing top or bonnet, so that the tops of all openings are on a level. Casing collars shall be fitted into place with a proper flange, or bead on the outside and drawn up on the inside, making a dust-tight joint. All collars shall be of same size as the warm air pipes to which they are to be connected and equally distributed around canopy.

(f) Brick, cement or hollow tile casings shall be constructed as follows: Walls shall be not less than eight inches (8″) in thickness, and shall be constructed air tight. The least inside dimension of rectangular casings shall be the same as that of the portable casing of a corresponding size of furnace. Walls shall be carried to the same height as the portable walls, allowing not less than eight inches (8″) between the top of the furnace and the bottom of the top cover. After placing the collars for the warm air

pipes, continue the masonry up 2″ above the top of the collars, lay angle or tee irons across the furnace top, spaced 8″, cover these with sheet metal not less than 26 U. S. S. gauge, cover the sheet metal with masonry or sand and run the side walls four inches (4″) above the roof of the furnace. A galvanized iron casing bonnet may be used on a brick set furnace.

Provision shall be made in the walls for a manhole to give ingress to heater.

Warm Air Pipes in Basement

Paragraph 5. (a) All warm air pipes shall be made of bright tin not lighter than IC, or galvanized iron. Side seams shall be locked seams. All joints shall be either double seamed or lapped not less than one and one-quarter inches (1¼″) and such joints shall be match-beaded, or beaded and soldered, or riveted. All pipes and fittings shall be properly secured to ceiling or joist. No solder or riveted joint is required where round pipe slips over the casing collar or enters boot or box. Any pipe twelve inches (12″) or greater in diameter shall not be made of material lighter than IX tin or No. 26 U. S. Standard Gauge galvanized iron.

(b) All basement warm air pipes shall have an upward pitch of not less than one inch (1″) per running foot.

(c) No warm air pipes or fittings shall run within one inch (1″) of any woodwork, unless such woodwork is covered with asbestos paper and the paper covered with tin or iron.

(d) All warm air pipes in basement shall be provided with dampers supported on both sides, not more than two feet (2′) from the casing.

(e) Where warm air pipes pass through a masonry wall, a metal thimble must be provided, having a diameter of at least one inch (1″) greater than the pipe, and the pipe supported in such a manner that the air space is uniform on all sides.

Wall Stacks

Paragraph 6. (a) Single Stacks. All single wall stacks or wall pipes, heads, boots, ells, tees, angles and other connections shall be made of bright tin or galvanized iron and shall be covered with not less than one thickness of 12 lbs. per one hundred (100) square feet of asbestos paper. All studding and other woodwork facing said pipe shall be lined with metal and metal lath used in place of wood lath. An air space of not less than five-sixteenths (5/16) of an inch shall be allowed on the two sides nearest the vertical studs. All such pipes shall be braced in a proper manner so as not to obstruct the flow of air but to retain the full capacity throughout. All joints shall be locked and held in place by means of lugs, or straps. No joint shall depend wholly upon solder to make it tight.

(b) Double Stacks. All double wall stacks or wall pipes, heads, boots, ells, tees, angles and other connections shall be made of bright tin, not lighter than IC or galvanized iron and shall be made double, from and including the boot or foot piece in basement to the top of each and every stack and register head on all floors. There shall be continuous uniform air space of not less than five-sixteenths (5/16) of an inch, which must be maintained between the outer and inner walls of all such pipes and fittings of all kinds, styles and descriptions; such pipes, heads, boots and other fittings to be of the styles, or equal to those accepted by the National Board of Fire Underwriters.

(c) All stacks and fittings either single or double must be secured firmly in place by lugs or straps attached to the outer walls of stacks and fittings, and no nails shall be driven through these stacks or fittings at any point. No lugs or straps shall be formed by cutting holes in outer walls of stacks or fittings. No wall pipes or fittings shall be used which depend wholly on soldered joints. The various members shall be so made that all joints are locked or soldered and the several members shall be attached to each other with slip joints, which are, for the purpose intended, air tight.

(d) Where stacks, heads, boots or other fittings, whether double or single, go through the first floor, all openings around such heads, boots, stacks or fittings must be filled with asbestos cement or other incombustible material to make the openings gas and dust tight.

Registers

Paragraph 7. (a) When baseboard or wall registers are used they shall be attached permanently to the stack head in such a manner that will prevent any leakage of air between the head and the register.

(b) Floor registers shall be provided either with register borders or double register boxes of tin or galvanized iron, with an air space of not less than five-sixteenths (5/16) of an inch between inner and outer boxes.

(c) Registers for warm air and warm air pipes shall not be located in outside walls.

(d) Any furnace system having not more than two warm air registers, at least one of such registers shall be without valves or louvers, and the pipe leading thereto shall be without dampers.

SECTION III

Air Supply to Furnace

Paragraph 1. (a) The air supply to the furnace for warm air heating plants may be taken from outside or from within the building or may be taken partially from outside and partially from within. In no case, however, shall air be supplied to any furnace from any basement or furnace room not occupied as living quarters.

(b) The cold air intake or return where air is taken from within the building shall have a net area throughout its entire length of not less than the combined net area of all warm air pipes leading

from the furnace. This may be maintained in one or more ducts. No reverse incline or air trap will be allowed in any section thereof.

(c) When the cold air supply is taken wholly from the outside of the building the supply duct at its most contracted area must equal or exceed eighty per cent (80%) of the combined area of all warm air pipes leading from the furnace.

(d) Cold air ducts shall be constructed of metal, tile or other incombustible material having smooth inner surface and shall maintain a constant net area throughout their entire length and shall be made dust tight. Horizontal, square or oblong return ducts shall have at least 10% greater area than vertical connecting pipes. Where a boot or shoe is connected to the casing at the base, the opening shall not extend higher than a line on the level of the grate of the furnace. The width of the shoe shall be of proper measurement to make the area at least equal to that of the round or square pipe to which it is connected.

(e) Wherever the space between joists is used to convey cold air over head, the joists and all wooden surfaces between such joists shall be lined with metal and a sheet metal pan constructed to extend not less than two (2) inches below said joists. The connection from this pan to the boot or shoe shall be made of galvanized iron not lighter than No. 26 U. S. Standard Gauge, and shall have a transition collar, the top area of which shall be at least 10% greater than the area of the connecting pipe.

(f) When it is necessary to set the furnace over a pit and connect up cold air under the basement floor, such pit or cold air trench shall not exceed eighteen (18) inches in depth below the casing ring, and the width of the trench or trenches shall be of proper measurement to make the area at least equal to the pipe to which it is connected. The connection between the cold air pipe or duct and the underground pit shall be made with a transition joint as described in Section III (e).

(g) The cold air face or faces shall be made of wood, or metal. When set in floors the top of same shall be flush with floor. Where cold air face is placed in a seat or side wall the open work of face must extend to within at least one (1) inch of the floor line, and not more than fourteen (14) inches above floor line. The free area of cold air faces shall be at least equal to the free area of the duct or ducts to which they are connected.

Paragraph 2. When a fan is installed in the air supply duct of a gravity system the same net area of all ducts shall be maintained as calculated under Section 1, Paragraph 1, 2 and 3 and in Section 3, Paragraph 1-(b).

SECTION IV

Smoke Pipes

Paragraph 1. (a) The smoke pipe shall be as short and direct as consistent with the location of the furnace. It shall be made of metal not lighter than No. 24 U. S. Standard gauge, and not less than the full size of the collar on the furnace throughout its entire length. It must have no opening for attaching any fire place, stove, range, waterheater, gas or ventilating connection. It shall be lock seamed or riveted; all joints shall lap not less than one and one-half (1½) inches and it shall be rigidly secured. Cast iron smoke pipe may be used.

(b) All smoke pipes shall be provided with check dampers, placed on the side of the pipe or at the end of a tee; when cast iron smoke pipe dampers are used they must be placed between the check damper and the furnace and supported on both side of the pipe.

(c) Where the smoke pipe enters the flue, a thimble shall be cemented into the flue, and the connections thereto made air tight. Should any smoke pipe come within eighteen (18) inches of any combustible material, such combustible material must be covered with asbestos paper and a metal shield so fastened that a two-inch air space exists between this shield and the combustible material. This shield shall be no less in size than twice the diameter of the smoke pipe and of sufficient length to cover the combustible material at all points.

(d) No smoke pipe shall project through any external wall or window. No furnace connection is to be made to a flue without a cast iron or steel cleanout having first been provided in the flue, (not more than eight (8) inches below the smoke pipe opening). The base of the flue shall be filled up to the bottom of the clean out: all of which must be made air tight.

SECTION V

Provisions to Be Made in Any Building Under Construction for Reception of Warm Air Furnace Heating Plants by Owner or Building Contractor.

Paragraph 1. (a) The owner or general contractor shall provide a chimney for the furnace, constructed smoke tight throughout its entire length. It must be of ample size and must extend at least three feet above a flat roof or two feet above the ridges of peak roofs and unobstructed by surrounding objects. The furnace flue must have no other opening for attaching any fireplace, stove range, boiler heaters, gas or ventilating connections.

(b) Where warm air register boxes, heads, pipe or stacks are to be installed, joists shall be set not less than sixteen inches (16″) on centers and shall be butted and not lapped. Studding shall be set directly over and under joists, leaving a space of not less than fourteen inches (14″) between studs and joists. Wherever joists are cut, headers must be put in to support joists. In all houses having studded exterior walls, all spaces between studding shall be closed at the attic line. All par-

tition walls (or sections of these walls) in which warm heat stacks to second or third floor rooms are to be installed, shall be of sufficient size to accommodate stacks required to heat said rooms.

(c) In new construction, it shall be unlawful for anyone to do any cutting of woodwork for the reception of the wall stacks or baseboard registers except the general contractor or the contractor in charge of the work for him, or some duly qualified mechanic.

(d) Installation of new work in old houses shall in general conform to the provisions of this section.

Room Heaters

Paragraph 2. Whenever furnaces or room heaters are supported by legs not less than five inches (5″) high, and set on a combustible floor, the floor under same shall be covered with incombustible material, extending not less than twelve inches (12″), on sides and back of heater and thirty-six inches (36″) in front of said heater.

SECTION VI

Pipeless or One Pipe Furnaces

Paragraph 1. (a) When but one duplex grating is used for both warm and cold air in a so-called pipeless furnace, the area of the cold air intake shall be at least equal to the area of the warm air outlet of the grating. Section II, Paragraph 5 (b) relative to casings, shall not govern when this type of furnace is installed, but the following specifications shall be followed:

The inner and outer casing of this type of furnace may be made of either black or galvanized iron not lighter than No. 26 U. S. Standard gauge. A uniform air space shall be maintained at all points between the inner and outer casing.

In no case shall the top of the heater be allowed closer than twelve inches to any ceiling or joists above this furnace.

(b) Where joists are cut to accommodate this furnace, headers shall be put in and braced.

(c) Section I, Paragraphs 1 to 3, inclusive, for determining area of warm air pipe shall not govern in figuring a pipeless furnace.

(d) Where one warm air register face is used and separate face or faces for cold air supply are used, then all sections of this ordinance shall apply the same as if a pipe furnace were installed.

SECTION VII

Paragraph 1. It shall be unlawful for any person, persons, firm or corporation to construct, replace or install any warm air heating furnaces or appurtenances thereto within the city of ..... without first obtaining from the Building Department a permit to do such work, for which said person, firm or corporation shall pay to said ..... for the use of said city, for each furnace installed, renewed or remodeled the sum of fifty cents and for each warm air outlet or stack head installed, remodeled or renewed the sum of twenty-five cents. Where more than one room is to be heated by one warm air register, the price charged per permit shall be fifty cents for furnace and twenty-five cents for each room to be heated.

SECTION VIII

Paragraph 1. It shall be the duty of the building inspection department to inspect all warm air furnaces and appurtenances thereto hereafter installed or constructed in conformity to the provisions of this ordinance. The expense of such inspection shall be paid out of the fees received for permits to install or construct such warm air furnaces and appurtenances, and any balance remaining in the amount so paid in any calendar year, not used for inspection purposes aforesaid, shall be turned in to the general revenue fund of the city on the 31st day of December of each year.

Paragraph 2. Inspection of new work shall be made as follows: When such work has proceeded to where the stacks to upper floors and heads for all side wall registers have been installed, and the boots have been connected thereto, the contractor, or person obtaining permit for this work, shall notify the inspection department, who shall make or cause to be made an inspection of such work. Upon finding that the work complies in all respects with the terms of this Ordinance, there shall be affixed by said Inspector or his representative to each stack or register head a certificate stating that the work complies with the Ordinance relating thereto. It shall be unlawful to sell, vend or install any warm air furnace unless the manufacturer of said furnace has filed with the Building Inspection Department proof that the capacity of such furnace has been computed in accordance with the furnace rating formula given in Section I, Paragraph 10.

Paragraph 3. No heating permits shall be required for minor repair work. By minor repair work is meant the incidental repairs to furnaces, which shall not affect the general action of the system, such as renewal of grates, smoke pipes and resetting old furnaces in same location; changing or renewing of single warm air pipes in basement; but where stacks or fittings are renewed or installed, a permit shall be required.

(a) Final inspection of plant shall be made after the whole is connected up and ready to operate, but before any fire has been started in same.

Paragraph 4. It shall be unlawful for any person to lath over, plaster or cover up any warm air heating work before such work has been inspected and certificates above referred to have been attached. The building department shall have the right and authority to remove or order removed all such lath, plaster or other covering which may have been placed over such work before same has been inspected. The person, persons, firm or corporation ordering or causing such work to be covered up, or in any way violating any section of this Ordinance as herein set forth, shall upon conviction, be subject to the pen-

alties set forth for violation of the terms of this chapter.

SECTION IX

Validity

Paragraph 1. Should any section or provision of this Ordinance be held unconstitutional or invalid by any court, all other sections and provisions shall nevertheless be deemed as effective as though such unconstitutional or invalid section or provision had never been inserted in this Ordinance.

SECTION X

This Ordinance to Govern in Case of Conflict with Other Ordinances

Paragraph 1. All ordinances, or parts of ordinances, inconsistent with the provisions of this Ordinance are hereby repealed.

SECTION XI

Penalty

Paragraph 1. Any person, persons firm or corporation who shall neglect to take out a permit on any warm air heating plant or fail to ask for inspection of same as provided for herein, shall be deemed guilty of misdemeanor and upon conviction shall be fined not less than $50.00 or more than $200.00 for each offense.

Any person, persons, firm or corporation who shall violate any other part of this Ordinance, shall upon conviction be fined not less than Five Dollars ($5.00) or more than Twenty-five Dollars ($25.00), for each offense.

SECTION XII

That this ordinance shall take effect and be in force from and after the earliest period allowed by Law.

Passed .....

..... Mayor

Attest:

..... City Clerk

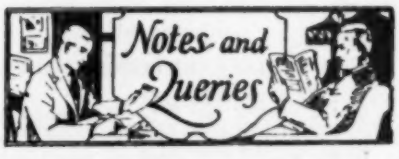
(Seal)

Pennig Heating Company, St. Paul, Averages $420 Per Job

Alfred T. Pennig, of the Pennig Heating Company, 423 University Avenue, St. Paul, Minnesota, finds a great many warm air furnace men interested in doing a little more than is required of them to get by.

Mr. Pennig writes that his company has had a fairly successful year. Up to December 1 he sold 156 furnaces, which were almost all replacement jobs. From these he took in $67,180, or an average of $420 per job, which is not bad at all.

All of the systems installed by the Pennig Heating Company done so on a heat requirement basis, and in almost every case they use an individual pipe to each room. It is seldom, if ever, that they connect an upstairs room with a downstairs room with the same pipe. A cold air is taken out of every room and from the outside walls.



"Arco" Temperature Regulator

From Leo A. Tilford, 1224 Loeser Avenue, Jackson, Michigan.

Please advise me who manufactures the "Arco" Temperature Regulator.

Ans.—American Radiator Company, 820 South Michigan Avenue, Chicago, Illinois.

Hygrometers

From W. H. Foura, Corning, Ohio.

Kindly advise who handles hygrometers used for measuring humidity.

Ans.—E. Vernon Hill Company, 121 North Clark Street, Chicago, Illinois.

Cast Iron Smoke Pipe

From American Foundry and Furnace Company, Bloomington, Illinois.

Please advise who manufactures cast iron smoke pipe.

Ans.—Waterloo Register Company, Waterloo, Iowa.

Draft Gauges

From South Bend Spark Arrester Company, South Bend, Indiana.

Please advise us who manufactures draft gauges.

Ans.—Ellison Draft Gauge Company, 214 West Kinzie Street, Chicago, Illinois; Hays Corporation, Michigan City, Indiana, and E. Vernon Hill Company, 121 North Clark Street, Chicago, Illinois.

Kentucky Hardware & Implement Association, Seelbach Hotel, Louisville, Kentucky, January 17 to 20, 1927. Secretary-treasurer, J. M. Stone, 200 Republic Building, Louisville, Kentucky.

Missouri Retail Hardware Association, the Hotel Statler, St. Louis, January 23-25. F. X. Becherer, secretary, 5106 North Broadway, St. Louis.

Sheet Metal Contractors' Association of Indiana, January 24, 25 and 26, 1928, at Indianapolis, Indiana. Executive secretary, Paul R. Jordan, 631 South Delaware Street, Indianapolis.

Indiana Warm Air Heating and Ventilating Association, January 24, 25 and 26, 1928, Indianapolis. Secretary Frank E. Anderson, 2242 Liberty avenue, Terre Haute, Indiana.

Indiana Fur. Mets, January 24, 25 and 26, 1928, Indianapolis. Secretary Harry R. Jones, 308 Kenmore Road, Indianapolis.

Nebraska Retail Hardware Association, Omaha, January 31 to February 3. George H. Dietz, secretary, 414-19 Little Building, Lincoln.

Indiana Retail Hardware Association, Indianapolis, January 31 to February 3. The Claypool Hotel will be convention headquarters and meeting place. G. F. Sheely, secretary, 911 Meyer-Kiser Bank Building, Indianapolis.

Master Sheet Metal Contractors' Association of Wisconsin, Republican Hotel, Milwaukee, Wisconsin, February 6 and 7, 1928. L. F. Reinke, 514 Market Street, Milwaukee, Wisconsin, secretary.

Michigan Retail Hardware Association, Detroit, February 7-10. The Statler Hotel will be headquarters. A. J. Scott, secretary, Marine City.

Wisconsin Retail Hardware Association, Auditorium, Milwaukee, February 7-10. P. J. Jacobs, secretary, Stevens Point.

Iowa Retail Hardware Association, Des Moines, February 14-17. A. R. Sale, secretary, Mason City.

Illinois Retail Hardware Association, February 14, 15 and 16, at the Sherman Hotel, Chicago. Leon D. Nish, secretary, 14-16 North Spring Street, Elgin.

Pennsylvania and Atlantic Seaboard Hardware Association, Philadelphia Commercial Museum, February 14-17. Sharon E. Jones, secretary, Wesley Building, Philadelphia.

Minnesota Retail Hardware Association, New Municipal Auditorium, Minneapolis, February 21-24. C. H. Casey, manager, Nicollet at 24th Street, Minneapolis.

Ohio Hardware Association will hold its 1928 convention and exhibit at Toledo, February 21-24. James B. Carson, secretary, 411 Mutual Home Building, Dayton.

South Dakota Retail Hardware Association, Coliseum Building, in Sioux Falls, February 27, 28, 29, 1928. Charles H. Casey, Secretary, Nicollet at 24th Streets, Minneapolis.

Outlook in Steel Industry for 1928 Is Promising—Rail Requirements Give Strong Support

Pig Iron Prices Remain Firm— Nonferrous Prices Steady

HIGH expectations for the first quarter, which inspired the heavy forward coverage of iron and steel requirements in December, now enter the period of fulfillment.

The good feeling which quickened practically all markets in the closing weeks of the year has emerged unscathed from the holiday apathy and, with unquestioned evidence of renewed activity in such major outlets for iron and steel as the railroads, automotive and oil industries, the promise for 1928 is bright.

At the beginning of this year a confident tone prevails throughout the steel industry. Specifications are larger and production is increasing. The prospect is that output will rise rapidly in the next 60 to 90 days.

Railroads continue to give the strongest support to the steel makers, both directly and indirectly.

The year 1927 brought out a new buying policy by steel consumers, that of purchasing for spot or short term requirements. This was practiced to a greater degree than ever before, according to Chicago producers. Chicago mills also report 1927 as a year of extremely keen competition, by rail and water from the east. In some quarters competition was regarded as the keenest in history.

Pig Iron

Pig iron makers have acquired good backlogs as a result of recent heavy selling, especially in Ohio, Michigan, Indiana and Wisconsin districts. Shipping instructions are improving. The buying movement for first quarter, which developed in December, has netted furnace interests with headquarters at Cleveland approximately 320,000 tons.

Pig iron sellers in the Chicago district report the heaviest backlogs in many months. Shipping orders there for first quarter are in excess of any received in the past four or five months. December sales "represented a real buying movement for first quarter." Less than one-half the first quarter tonnage in the Chicago district remains to be placed.

Less activity is noted in the eastern markets. Demand for low phosphorus iron has picked up; one Pittsburgh consumer has placed 1,000 tons and another is in the market for 500 tons. The surplus foundry iron stocks in Alabama are reported 20 per cent heavier at this time than a year ago.

Prices exhibit a firmer tendency in most districts, but are quotably unchanged from a week ago. One or two sales of foundry iron have carried a price of $17.50, base, valley, though $17.25 generally is available. Basic is nominal at $17, valley. The Chicago price of foundry iron is firm at $18.50, base.

Copper

Seasonal dullness prevails in the nonferrous metal market, but prices are steady. Export buying featured in copper and while domestic demand was lacking the market held unchanged at 14.00 cents to 14.12½ cents, delivered Connecticut.

Lead

Lead was a little more active but unchanged at 6.50 cents, New York, and 6.32½ cents to 6.35 cents, East St. Louis.

The first week of the year opens with a moderate volume of demand, which it is believed would be quickened considerably by any renewal of the late gradual upward trend abroad, as there is undoubtedly a good deal of latent consuming interest, especially for February shipment.

Zinc

Some inquiry for zinc was out but actual trading was limited. The zinc price, however, held unchanged all week at 5.62½ cents, East St. Louis.

Tin

The tin statistics for December made remarkably good showing, so good in fact that they are generally regarded with the suspicion that they do not correctly portray the real situation. The principal statisticians reported only moderate increases in the world's visible supplies.

Tin was steady around 58.00 cents, fluctuating in a narrow range.

Solder

Chicago warehouse prices on solder are as follows: Warranted 50-50, $36.50; Commercial 45-55, $33.50; plumbers', $30.50; all per 100 pounds.

Old Metals

Wholesale quotations in the Chicago district, which should be considered as nominal, are as follows: Old steel axles, $15.00 to $15.50; old iron axles, $19.00 to $19.50; steel springs, $14.25 to $14.75; No. 1 wrought iron, $10.50 to $11.00; No. 1 cast, $12.75 to $13.25, all per net tons. Prices for non-ferrous metals are quoted as follows, per pound: Light copper, 9 cents; zinc, 3½ cents; cast aluminum, 13¾ cents.

Ingot output of the United States Steel corporation is now at 70 per cent of capacity, a substantial gain in the last week from the low level of the Christmas holidays, around 60 per cent. Operations were at 73 per cent before the holiday shutdowns. The average for the entire industry is now around 67 per cent, against 57½ per cent in the holiday period. Early in 1927 the average for the industry was about 75 per cent.

Declines of from nearly 2 to 5 points were recorded in a wide assortment of shares, including United States Steel common, General Motors, International Harvester.

Chicago Warehouse Metal and Furnace Supply Prices

AMERICAN ARTISAN is the only publication containing Western Metal, Furnace Supply and Hardware prices corrected weekly.

METALS

PIG IRON

Chicago Fdy., No. 2	$18 50
Southern Fdy. No. 2	22 01
Lake Superior Charcoal	27 04
Malleable	18 50

FIRST QUALITY BRIGHT TIN PLATES

1C	20x28, 112 sheets	$25 10
IX	20x28	29 60
IXX	20x28, 56 sheets	16 20
IXXX	20x28	17 65
IXXXX	20x28	18 95

TERNE PLATES

		Per Box
IC	20x28, 40-lb. 112 sheets	$26 00
IX	20x28, 40-lb. 112 sheets	28 50
IC	20x28, 25-lb. 112 sheets	21 75
IX	20x28, 25-lb. 112 sheets	24 25
IC	20x28, 20-lb. 112 sheets	20 00
IV	20x28, 20-lb. 112 sheets	22 50
IC	20x28, 15-lb. 112 sheets	18 50

"ARMCO" INGOT IRON PLATES

No. 8 ga. up to and including ¼ in.—100 lbs. $4 55

COKE PLATES

Cokes, 80 lbs., base, 20x28	$12 60
Cokes, 90 lbs., base, 20x28	13 80
Cokes, 100 lbs., base, 20x28	14 00
Cokes, 107 lbs., base, IC 20x28	14 30
Cokes, 135 lbs., base, IX 20x28	16 40
Cokes, 155 lbs., base, 56 sheets	9 20
Cokes, 175 lbs., base, 8# sheets	10 05
Cokes, 195 lbs., base, 56 sheets	10 90

BLUE ANNEALED SHEETS

Base 10 ga. per 100 lbs.	$3 50
"Armco" 10 ga. per 100 lbs.	4 00

ONE PASS COLD ROLLED BLACK

No. 18-20 per 100 lbs.	$3 75
No. 22 per 100 lbs.	3 90
No. 24 per 100 lbs.	3 95
No. 26 per 100 lbs.	4 05
No. 27 per 100 lbs.	4 10
No. 28 per 100 lbs.	4 20
No. 29 per 100 lbs.	4 35
No. 30 per 100 lbs.	4 45

"ARMCO" GALVANIZED

"Armco" 24 per 100 lbs. $6 15

GALVANIZED

No. 16 per 100 lbs.	$4 30
No. 18 per 100 lbs.	4 45
No. 20 per 100 lbs.	4 60
No. 22 per 100 lbs.	4 65
No. 24 per 100 lbs.	4 80
No. 26 per 100 lbs.	5 05
No. 27 per 100 lbs.	5 15
No. 28 per 100 lbs.	5 30
No. 30 per 100 lbs.	5 70

BAR SOLDER

Warranted 50-50 per 100 lbs.	$36 50,
Commercial 45-55 per 100 lbs.	33 50
Plumbers per 100 lbs.	30,50

ZINC

In Slabs ..... $ 8 50

SHEET ZINC

Cash Lots (600 lbs.)	$12 00
Sheet Lots	13 00

BRASS

Sheets, Chicago base	17¾c
Mill base	18c
Tubing, brazed base	26¾c
Wire, base	18¾c
Rods, base	15½c

COPPER

Sheets, Chicago base	22¾c
Mill Base	21¾c
Tubing, seamless base	25¾c
Wire, No. 9, B & S Ga.	18¾c
Wire, No. 10, B & S Ga.	19c
Wire, No. 11, B & S Ga.	19¾c
Wire, No. 8, B & S Ga. and heavier	18½c

LEAD

American Pig	$7 25
Bar	8 25

TIN

Pig Tin per 100 lbs.	$65 50
Bar Tin per 100 lbs.	66 50

HARDWARE, SHEET METAL SUPPLIES, WARM AIR FURNACE FITTINGS AND ACCESSORIES.

ASBESTOS

Paper up to 1/16	6c per lb.
Roll board	6¼c per lb.
Mill board 3/32 to ⅛	6c per lb.
Corrugated Paper (250 sq. ft. to roll)	$6 00 per roll

BRUSHES

Hot Air Pipe Cleaning Bristle, with handle, each	$0 85
Flue Cleaning Steel only, each	1 25

BURRS

Copper Burrs only 40-5%

CEMENT, FURNACE

American Seal, 5-lb. cans, net	$ 40
American Seal, 10-lb. cans, net	80
American Seal, 25-lb. cans, net	2 00
Pecora per 100 lbs.	7 51

CHIMNEY TOPS

Adams' Revolving

	Wt. Doz.	Price Doz.
4 in.	21 lbs.	$11 00
6 in.	24 lbs.	11 50
7 in.	30 lbs.	13 50
8 in.	33 lbs.	15 00
9 in.	51 lbs.	16 50
10 in.	56 lbs.	18 00
12 in.	66 lbs.	22 00
14 in.	110 lbs.	36 00

CLINKER TONGS

Front Rank, each	$0 75
Per doz.	8 40

CLIPS

Damper

Adams No.-Rivet Steel, with tail pieces, per gross	$9 00
Tail pieces, per gross	2 50

COPPERS—Soldering

Pointed Roofing

3 lb. and heavier per lb.	40c
2½ lb. per lb.	45c
2 lb. per lb.	48c
1½ lb. per lb.	55c
1 lb. per lb.	60c

CORNICE BRAKES

Chicago Steel Bending

Nos. 1 to 6B ..... Net

CUT-OFFS

Gal., plain, round or cor. rd.

26 gauge	30%
28 gauge	35%

DAMPERS

"Yankee" Hot Air

7 inch, each	20c, doz.	$1 75
8 inch, each	25c, doz.	2 40
9 inch, each	30c, doz.	2 75
10 inch, each	32c, doz.	3 00

Smoke Pipe

7 inch, each	$0 35
8 inch, each	40
9 inch, each	50
10 inch, each	60
12 inch, each	90

ADAMS No. 1 CHECK

Check and Collar Complete

8 inch, each	2 00
9 inch, each	2 25

End Check Only

8 inch, each	1 80
9 inch, each	1 85

Collar Only

8 inch, each	50
9 inch, each	65

No. 2 CHECK

8 inch, each	1 00
9 inch, each	1 00

10% Disc. on Adams No. 1 and No. 2 Check

Diamond Smoke Pipe

7 inch, doz.		$ 2 00
8 inch, doz.		3 20
9 inch, doz.		4 80
10 inch, doz.		6 00

Adams' Sheet Metal

7 inch, doz.	$ 1 60
8 inch, doz.	2 20
9 inch, doz.	2 60
10 inch, doz.	2 80
12 inch, doz.	3 50
14 inch, doz.	5 00

DIGGERS

Post Hole

Iwan's Split Handle (Eureka)

4-ft. Handle per doz.	$14 00
7-ft. Handle per doz.	36 00

Iwan's Hercules pattern, per doz. 14 90

EAVES TROUGH

Galv. Crimpedge, crated 75 &	5%
Zinc, "Barnes"	60%

ELBOWS

Conductor Pipe

Galv. plain or corrugated, round flat Crimp.

28 Gauge	60%
26 Gauge	45%
24 Gauge	15%

Galv. & Terne Steel

Plain Rd. and Rd. Corr.:

28 Ga.	60%
26 Ga.	45%
24 Ga.	15%

Square Corrugated

No. 28 Gauge	50%
26 Gauge	35%

Portico Elbows

Standard Gauge Conductor Pipe, plain or corrugated.

Not nested	70 & 5%
Nested solid	70 & 5%

Sq. Corr., A. & B. & Octagon

28 Ga.	50%
26 Ga.	35%

Portico

1", 1¼", 1½"	45%

Copper

16 oz., all designs 50%

Zinc—

All styles 60%

ELBOWS—Stove Pipe

1-piece Corrugated. Uniform Blue "Milcor" No. 28 Gauge.	Doz.
5-inch	$1 05
6-inch	1 20
7-inch	1 75

Special Corrugated

6-inch	$1 00
7-inch	1 60

Adjustable—Uniform Blue

"Milcor" No. 28 Gauge. Uniform Blue.

5-inch	$1 65
6-inch	1 75
7-inch	2 10

WOOD FACES—50% off list.

FENCE

726-6-12½ % (100 rods)	$28 68
1948-6-14½ % (100 rods)	43 62

FILES AND RASPS

Heller's (American)	50-10%
American	60-10%
Arcade	50%
Black Diamond	50%
Eagle	50%
Great Western	50%
Kearney & Foot	50%
McClellan	50%
Nicholson	50%
Simonds	60%

FIRE POTS

Clayton & Lambert's

East of west boundary line of Province of Manitoba, Canada, No. Dakota, So. Dakota, Nebraska, Kansas, Oklahoma, Amarillo, San Angelo and Laredo, Texas 52%
West of above boundary 48%

Geo. W. Diener Mfg. Co. — Ea.

No. 02 Gasoline Torch, 1 qt.	$ 5 55
No. 0250, Kerosene, or Gasoline Torch, 1 qt.	7 50
No. 10 Tinner's Furn. Square tank, 1 gal.	12 60
No. 15 Tinner's Furn. Round tank, 1 gal.	12 00
No. 21 Gas Soldering Furnace	3 60
No. 110 Automatic Gas Soldering Furnace	10 50

Double Blast Mfg. Co.

Gasoline, Nos. 25 and 26 ... 60%

Quick Meal Stove Co.

Vesuvius, F. O. B. St. Louis 30% (Extra Disct. for large quantities.)

GALVANIZED WARE

Pails (Galv. after made), 10-qt.	$2 12
Tubs (Galv. after made). No. 1	6 90
No. 2	6 35

GLASS

Single Strength, A, 25-in. brackets	87%
Single Strength, A, 34 to 40-in. bracket	86%
Single Strength, A, all other brackets	89%
Double Strength, A, all sizes	86%

HANGERS

Conductor Pipe

Milcor Perfection Wire	25%
Milcor Triplex Wire	10%

Eaves Trough

Milcor Steel (galv. after forming) List	plus 12½%
Milcor Selflock E. T. Wire, List	plus 50%

HOOKS

Box

V. & B. No. 1, each $0 26

Conductor

"Direct Drive" Wrought Iron for wood or brick .. 15%

Hay

V. & B. No. 1, each $0 20

HUMIDIFIER

"Front-Rank," Automatic

In single lots	50%
In lots of 10 or more	50-5%
In lots of 25 or more	50-10%
Vapor pans, etc., each	50%

LIFTERS

Stove Cover

Coppered per gro.	$6 00
Alaska per gro.	4 75

MALLETS

Tinners

Hickory ..... per doz. $2 25

MITRES

Galvanized steel mitres.

28 Ga.	70
26 Ga.	60-20

NAILS

Cut Steel	$4 25
Cut Iron	4 25

Wire

Common	2 95
Cement Coated	2 95

Continued on Page 36)

ADVERTISERS' INDEX

The dash (—) indicates that the advertisement runs on a regular schedule but does not appear in this issue.

Markets—Continued from Page 34

NETTING, POULTRY

Galvanized before weaving 57½-5%
Galvanized after weaving.52½-5%

PASTE

Asbestos Dry Paste:

200-lb. barrel	$16 00
100-lb. barrel	8 75
25-lb. pail	3 50
10-lb. bag	1 10
5-lb. bag	60
2½-lb. cartons	25

PIPE

Conductor
Cor. Rd., Plain Rd., or Sq.

Galvanized
Crated and nested (all gauges) 75-2½%
Crated and not nested (all gauges) 70-15%

Furnace Pipe
Double Wall Pipe and Fittings 60%
Single Wall Pipe, Round Galvanized Pipe 60%
Galvanized and Tin Fittings 60%

Lead
Per 100 lbs.....$12 50

Stove Pipe
"Milcor" "Titelock" Uniform Blue Stove

28 gauge, 5 inch U. C. nested	10 50
28 gauge, 6 inch U. C. nested	11 00
28 gauge, 7 inch U. C. nested	13 00
30 gauge, 5 inch U. C. nested	9 00
30 gauge, 6 inch U. C. nested	10 00
30 gauge, 7 inch U. C. nested	12 00

T-Joint Made up
6-inch, 28 ga....per doz. $ 4 00

All Zinc
No. 11, all styles.....60%

POKERS, STOVE

W'r't Steel, str't or bent, ...per doz.	$0 75
Nickel Plated, coil handles, ...per doz.	1 10

POKERS, FURNACE

Each $0 50

PULLEYS

Furnace Tackle....per doz.	$0 60
.....per gro.	6 00
Furnace Screw (enameled) .....per doz.	75

Ventilating Register

Per gross	9 00
Small, per pair	30
Large, per pair	50

PUTTY

Commercial Putty, 100-lb. Kits $3 40

QUADRANTS

Malleable Iron Damper.....10%

REDUCERS—Oval Stove Pipe

	Per Doz.
7—6, 28-gauge, 1 doz. in carton	$ 2 00

REGISTERS AND BORDERS

Baseboard, Floor and Wall.
Cast Iron 20%
Steel and Semi-Steel.....40%
Baseboard 40%
Wall 40%
Adjustable Ceiling Ventilators 40%

Register Faces—Cast and Steel
Japanned, Bronzed and Plated, 4x6 to 14x14.....40%
Large Register Faces—Cast, 14x14 to 38x42.....60%
Large Register Faces—Steel, 14x14 to 38x42.....65%

RIDGE ROLL

Galv., Plain Ridge Roll, b'did 75-10-5%
Galv., Plain Ridge Roll crated 75-10%
Globe Finials for Ridge Roll 50%

ROOFING

	Per Square
Best grade, slate surf. prepared	$ 2 30
Best talc surfaced	2 65
Medium talc surfaced	2 00
Light talc surfaced	1 30
Red Rosin Sheeting, per ton	$7 00

SCREWS

Sheet Metal

7, ½x⅛, per gross	$0 52
No. 10, ¾x3/16, per gross.	68
No. 14, ⅞x¼, per gross..	89

SHEARS, TINNERS' & MACHINISTS'

Viking $22 00

Lennox Throatless
No. 18 .....35%
Shear blades 10%
(f. o. b. Marshalltown, Iowa)

SHIELDS, REGISTER

No. 1 "Gem" floor.....$12 00 doz.
No. 2 "Gem" wall..... 6 00 doz.

SHOES

Galv. 28 Gauge, Plain or corrugated round flat crimp....60%
26 gauge round flat crimp....45%
24 gauge round flat crimp....35%

SNIPS, TINNERS'

Clover Leaf .....40 & 10%
National .....40 & 10%
Star 50%
Milcor .....Net

SQUARES

Steel and Iron .....Net
(Add for bluing, $3 per doz. net.)
Mitre .....Net
Try .....Net
Try and Bevel.....Net
Try and Mitre .....Net
Fox's .....per doz. $6 00
Winterbottom's 10%

STOPPERS, FLUE

Common .....per doz. $1 10
Gem, No. 1.....per doz. 1 10
Gem, flat, No. 3....per doz. 1 00

VENTILATORS

Standard .....30 to 40%

WIRE

Plain annealed wire, No. 8 per 100 lbs.	$3 05
Galvanized barb wire, per 100 lbs.	3 90
Wire Cloth—black painted, 12-mesh, per 100 sq. ft.	1 65
Cattle Wire—galvaniz'd catch weight spool, per 100 lbs.	3 65
Galvanized Hog Wire, 80 rod spool, per spool	3 18
Galvanized Plain Wire, No. 9, per 100 lbs.	3 40
Stove Pipe, per stone	1 10

WRINGERS

No. 730, Guarantee	each $5 10
No. 770, Bicycle	each 4 70
No. 670, Domestic	each 4 35
No. 110, Brighton	each 3 70
No. 750, Guarantee	each 5 10
No. 740, Bicycle	each 4 70
No. 22, Pioneer	each 3 40
No. 2, Superb	each 2 65

BUYERS' DIRECTORY

Acetylene (Gas) Dissolved.
Prest-O-Lite Co., Inc., New York, N. Y.

Air Filters.
Reed Air Filter Co., Louisville, Ky.

Bale Ties.
American Steel & Wire Co., Chicago, Ill.

Blowers.
Sturtevant Co., B. F., Boston, Mass.

Bolts—Stove.
The Kirk-Latty Co., Cleveland, Ohio
Lamson & Sessions Co., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., Chicago, Ill.

Brakes—Bending.
Dreis & Krump Mfg. Co., Chicago, Ill.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.

Brakes—Cornice.
Dreis & Krump Mfg. Co., Chicago, Ill.

Brass and Copper.
American Brass Co., Waterbury, Conn.
Copper & Brass Research Association, New York
Merchant & Evans Co., Philadelphia, Pa.

Cans—Garbage.
Osborn Co., The J. M. & L. A., Cleveland, Ohio

Castings—Malleable.
Fanner Mfg. Co., Cleveland, Ohio

Ceilings—Metal.
Burton Co., The W. J., Detroit, Mich.
Friedley-Voshardt Co., Chicago, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Wheeling Corrugating Co., Wheeling, W. Va.

Chaplets.
Fanner Mfg. Co., Cleveland, Ohio

Chimney Tops.
Standard Ventilator Co., Lewisburg, Pa.
Vail Mfg. Co., Fort Wayne, Ind.

Check Drafts.
Teela Sheet Metal Co., Oshkosh, Wis.

Clinker Tongs.
L. J. Mueller Furnace Co., Milwaukee, Wis.

Coal Chutes.
Majestic Co., The Huntington, Ind.

Copper.
American Brass Co., Waterbury, Conn.
Copper & Brass Research Association, New York

Cornices.
Friedley-Voshardt Co., Chicago, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Cut-offs—Rain Water
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Dampers—Quadrants—Accessories.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
L. J. Mueller Furnace Co., Milwaukee, Wis.
Parker-Kalon Corp., New York, N. Y.

Diffuser—Air Duct.
Aeolus-Dickinson Co., Chicago, Ill.
L. J. Mueller Furnace Co., Milwaukee, Wis.

Doors—Metal.
Lupton's Sons Co., David, Philadelphia, Pa.

Drive Screws—Hardened Metallic
Parker-Kalon Corp., 354 West 13th St., New York

Eaves Trough.
Barnes Zinc Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Burton Co., The W. J., Detroit, Mich.
Berger Co., L. D., Philadelphia, Pa.
Lupton's Sons Co., David, Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
New Jersey Zinc Sales Co., The New York, N. Y.
Wheeling Corrugating Co., Wheeling, W. Va.

Elbows and Shoes—Conductor.
Barnes Zinc Products Co., Chicago, Ill.
Dieckmann Co., Ferdinand, Cincinnati, Ohio
Lupton's Sons Co., David, Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Engineering—Fan Blast Warm Air Heating.
Herbert H. Davis Co., Inc., Chicago, Ill.

Wood Faces—Cold Air.
Auer Register Co., Cleveland, Ohio
American Wood Register Co., Plymouth, Ind.
Eaglesfield Ventilator Co., Indianapolis, Ind.
Marsh Lumber Co., Dover, Ohio
McClure Builders Supply Co., East Palestine, Ohio
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
United States Register Co., Battle Creek, Mich.

Fences.
American Steel & Wire Co., Chicago, Ill.

Fittings—Conductor.
Barnes Zinc Products Co., Chicago, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Flue Thimbles.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Furnace Cement—Asbestos.
Armstrong Co., The, Detroit, Mich.
Buckeye Products Co., The, Cincinnati, Ohio
Connors Paint Mfg. Co., Wm., Troy, N. Y.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Pecora Paint Co., Philadelphia, Pa.

Furnace Cement—Liquid.
Technical Products Co., Pittsburgh, Pa.

Furnace Cleaners—Suction.
Brillion Furnace Co., Brillion, Wis.
Sturtevant Co., B. F., Boston, Mass.

Furnace Fans.
A. H. Robinson Co., Massillon, Ohio
Robinson Furnace Co., Chicago, Ill.
Sturtevant Co., B. F., Boston, Mass.
Warm Air Furnace Fan Co., The Cleveland, Ohio

Furnace Rings.
Milwaukee Corrugating Co., Milwaukee, Wis.
Walworth Run Fdy. Co., Cleveland, Ohio

Furnaces—Gas.
Calkins & Pearce, Columbus, Ohio

Furnaces—Warm Air.
Agricola Furnace Co., Gadsden, Ala.
American Furnace Co., St. Louis, Mo.
American Foundry & Furnace Co., Bloomington, Ill.
Banner Mahoning Furnace Co., Youngstown, Ohio
Brillion Furnace Co., Brillion, Wis.
Calkins & Pearce, Columbus, Ohio
Colburn Heater Co., Chicago, Ill.
Herbert H. Davis Co., Inc., Chicago Ill.
Dowagiac Steel Furnace Co., Dowagiac, Mich.
Floral City Heater Co., Monroe, Mich.
Forest City-Walworth Run Fdy. Co., Cleveland, Ohio
Fox Furnace Co., Elyria, Ohio
Green Foundry & Furnace Works, Des Moines, Iowa
Hall-Neal Furnace Co., Indianapolis, Ind.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Hero Furnace Co., Sycamore, Ill.
Hess-Snyder Co., Massillon, Ohio
Homer Furnace Co., Coldwater, Mich.
International Heater Co., Utica, N. Y.
Keith Furnace Co., Des Moines, Iowa
Lamneck Co., W. E., Columbus, Ohio
Langenberg Mfg. Co., St. Louis, Mo.
Lennox Furnace Co., Marshalltown, Ia.; Syracuse, N. Y.
Marshalltown Heater Co., Marshalltown, Iowa
Majestic Co., The, Huntington, Ind.
May-Fiebeger Furnace Co., Newark, Ohio
Meyer Furnace Co., The, Peoria, Ill.
Monitor Furnace Co., Cincinnati, Ohio
Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Peerless Foundry Co., Indianapolis, Ind.
Premier Warm Air Heater Co., Dowagiac, Mich.
Richardson & Boynton Co., New York, N. Y.
Robinson Furnace Co., A. H., Massillon, Ohio
Robinson Furnace Co., Chicago, Ill.
Rybolt Heater Co., Ashland, Ohio
Schwab & Sons Co., R. J., Milwaukee, Wis.
Simmplex Furnace Co., Racine, Wis.
Security Stove & Mfg. Co., Kansas City, Mo.
Standard Furnace & Supply Co., Omaha, Neb.
St. Louis Heating Co., St. Louis, Mo.
Success Heater Mfg. Co., Des Moines, Iowa
Thomas & Armstrong Co., London, Ohio
Thatcher Co., Chicago, Ill.
XXth Century Heating & Ventilating Co., Akron, Ohio
Utica Heater Co., Utica, N. Y.
Waterman-Waterbury Co., Minneapolis, Minn.
Western Steel Products Co., Duluth, Minn.
Wise Furnace Co., Akron, Ohio

Garages—Metal.
Thomas & Armstrong Co., The London, Ohio

Gas (Acetylene) Dissolved.
Prest-O-Lite Co., Inc., New York, N. Y.

Gas (Nitrogen).
Linde Air Products Co., New York, N. Y.

Gas (Oxygen).
Linde Air Products Co., New York, N. Y.

Glass—Wire.
Lupton's Sons Co., David, Philadelphia, Pa.

Grilles.
Auer Register Co., Cleveland, Ohio
Harrington & King Perforating Co., Chicago, Ill.
Hart & Cooley Co., New Britain, Conn.
Independent Reg. Co., Cleveland, Ohio
Tuttle & Bailey Mfg. Co., Chicago, Ill.
United States Register Co., Battle Creek, Mich.

Grilles—Store Front.
Tuttle & Bailey Mfg. Co., Chicago, Ill.

Guards—Machine and Belt.
Harrington & King Perforating Co., Chicago, Ill.

Handles—Boiler.
Berger Bros. Co., Philadelphia, Pa.

Handles—Soldering Iron.
Hyro Mfg. Co., New York, N. Y.

Hangers—Eaves Trough.
Berger Co., L. D., Philadelphia, Pa.
Lupton's Sons Co., David, Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Heaters—Cabinet.
Fox Furnace Co., Elyria, Ohio
Majestic Co., The, Huntington, Ind.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Waterman-Waterbury Co., Minneapolis, Minn.

Heaters—Gas.
Calkins & Pearce, Columbus, Ohio

Heaters—School Room.
Floral City Heater Co., Monroe, Mich.
International Heater Co., Utica, N. Y.
Meyer Furnace Co., The, Peoria, Ill.
L. J. Mueller Furnace Co., Milwaukee, Wis.
Standard Furnace & Supply Co., Omaha, Neb.
Waterman-Waterbury Co., Minneapolis, Minn.

Hooks—Conductor.
Berger Co., L. D., Philadelphia, Pa.

Hotels.
Fort Shelby Hotel, Detroit, Mich.

Humidifiers.
Automatic Humidifier Co., Cedar Falls, Iowa
L. J. Mueller Furnace Co., Milwaukee, Wis.
Robinson Furnace Co., Chicago, Ill.

Lath—Expanding Metal.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Machines—Crimping.
Bertsch & Co., Cambridge City, Ind.

Machinery—Culvert.
Bertsch & Co., Cambridge City, Ind.

Machines—Tinsmith's.
Bertsch & Co., Cambridge City, Ind.
Burton Co., The W. J., Detroit, Mich.
Dreis & Krump Mfg. Co., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Iowa
Osborn Co., The J. M. & L. A., Cleveland, Ohio
Peck, Stow & Wilcox Co., Southington, Conn.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.
Unishear Co., Inc., New York, N. Y.
Whitney Mfg. Co., W. A., Rockford, Ill.
Whitney Metal Tool Co., Rockford, Ill.

Mandrels.
Hydro Mfg. Co., New York, N. Y.

Metals—Perforated.
Harrington & King Perforating Co., Chicago, Ill.

Miters.
Friedley-Voshardt Co., Chicago, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Miters—Eaves Trough.
Barnes Zinc Products Co., Chicago, Ill.
Lupton's Sons Co., David, Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Nails—Hardened Masonry.
Parker-Kalon Corp., New York, N. Y.

Nails—Wire.
American Steel & Wire Co., Chicago, Ill.

Nitrogen (Gas).
Linde Air Products Co., New York, N. Y.

Ornaments—Sheet Metal.
Friedley-Voshardt Co., Chicago, Ill.
Gerock Bros. Mfg. Co., St. Louis, Mo.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Oxygen (Gas).
Linde Air Products Co., New York, N. Y.

Paint.
Conners Paint Mfg. Co., Wm., Troy, N. Y.
Pecora Paint Co., Philadelphia, Pa.

Patterns—Furnace and Stove.
Cleveland Castings Pattern Co., Cleveland, Ohio
Quincy Pattern Co., Quincy, Ill.
Vedder Pattern Works, Troy, N. Y.

Pipe and Fittings—Furnace.
Burton Co., The W. J., Detroit, Mich.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Johnson Co., Chas., Inc., Peoria, Ill.
Lamneck Co., W. E., Columbus, Ohio
Meyer & Bro. Co., F., Peoria, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Mueller Furnace Co., L. J., Milwaukee, Wis.
Osborn Co., The J. M. & L. A., Cleveland, Ohio

BUYERS' DIRECTORY

Robinson Furnace Co., Chicago, Ill.
Standard Furnace & Supply Co., Omaha, Neb.

Pipe and Fittings—Stove.
Meyer & Bro. Co., F., Peoria, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Pipe—Conductor.
Barnes Zinc Products Co., Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Dieckmann Co., Ferdinand, Cincinnati, Ohio
Friedley-Voshardt Co., Chicago, Ill.
Lupton's Sons Co., David, Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
New Jersey Zinc Sales Co., The New York, N. Y.
Wheeling Corrugating Co., Wheeling, W. Va.

Posts—Steel Fence.
American Steel & Wire Co., Chicago, Ill.

Punches.
Bertsch & Co., Cambridge City, Ind.
Peck, Stow & Wilcox Co., Southington, Conn.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.
Whitney Mfg. Co., W. A., Rockford, Ill.
Whitney Metal Tool Co., Rockford, Ill.

Punches—Combination Bench and Hand.
Hyro Mfg. Co., New York, N. Y.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.
Whitney Metal Tool Co., Rockford, Ill.
Whitney Mfg. Co., W. A., Rockford, Ill.

Punches—Hand.
Hyro Mfg. Co., New York, N. Y.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.
Whitney Metal Tool Co., Rockford, Ill.
Whitney Mfg. Co., W. A., Rockford, Ill.

Putty—Stove.
Connors Paint Mfg. Co., Wm., Troy, N. Y.
Pecora Paint Co., Philadelphia, Pa.

Radiator Cabinets.
The Hart & Cooley Mfg. Co., New Britain, Conn.
Tuttle & Bailey Mfg. Co., Chicago, Ill.

Radiators—Shields.
Beh & Co., Inc., New York, N. Y.
The Thomas & Armstrong Co., London, Ohio

Ranges—Combination Gas & Coal.
Quick Meal Stove Co., St. Louis, Mo.
Thatcher Co., Newark, N. J.

Ranges—Gas.
Quick Meal Stove Co., St. Louis, Mo.

Register Shields.
Beh & Co., Inc., New York, N. Y.

Registers—Warm Air.
Auer Register Co., Cleveland, Ohio
Hart & Cooley Co., New Britain, Conn.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Independent Register & Mfg. Co., Cleveland, Ohio
Lamneck & Co., W. E., Columbus, Ohio
Majestic Co., The, Huntington, Ind.
Meyer & Bro. Co., F., Peoria, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Mueller Furnace Co., L. J., Milwaukee, Wis.
Robinson Furnace Co., Chicago, Ill.
Rock Island Register Co., Rock Island, Ill.
Standard Furnace & Supply Co., Omaha, Neb.
Tuttle & Bailey Mfg. Co., Chicago, Ill.
United States Register Co., Battle Creek, Mich.
Walworth Run Fdy. Co., Cleveland, Ohio
Waterloo Register Co., Waterloo, Iowa

Registers—Wood.
American Wood Register Co., Plymouth, Ind.
Auer Register Co., Cleveland, Ohio
Eaglesfield Ventilator Co., Indianapolis, Ind.
McClure Builders Supply Co., East Palestine, Ohio
Marsh Lumber Co., Dover, Ohio
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
L. J. Mueller Furnace Co., Milwaukee, Wis.
United States Register Co., Battle Creek, Mich.

Repairs—Stove and Furnace.
Hessler Co., H. E., Syracuse, N. Y.
Kramer Bros. Fdy. Co., Dayton, Ohio
Northwestern Stove Repair Co., Chicago, Ill.

Ridging.
Armco Distributors Ass'n of America, Middletown, Ohio
Lupton's Sons Co., David, Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Rivets—Stove.
The Kirk-Latty Co., Cleveland, Ohio
Lamson & Sessions Co., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., Chicago, Ill.

Rods—Stove.
The Kirk-Latty Co., Cleveland, Ohio
Lamson & Sessions Co., Cleveland, Ohio

Rolls—Forming.
Bertsch & Co., Cambridge City, Ind.

Roofing Cement.
Connors Paint Mfg. Co., Wm., Troy, N. Y.
Pecora Paint Co., Philadelphia, Pa.

Roof—Flashing.
Hessler Co., H. E., Syracuse, N. Y.
Milwaukee Corrugating Co., Milwaukee, Wis.

Roofing—Iron and Steel.
Armco Distributors Ass'n of America, Middletown, Ohio
Burton Co., The W. J., Detroit, Mich.
Friedley-Voshardt Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
Merchant & Evans Co., Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Osborn Co., The J. M. & L. A., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., Chicago, Ill.
Wheeling Corrugating Co., Wheeling, W. Va.

Roofing—Tin.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Taylor Co., N. & G., Philadelphia, Pa.
Wheeling Corrugating Co., Wheeling, W. Va.

Roofing—Zinc.
New Jersey Zinc Sales Co., The, New York, N. Y.

Rubbish Burners.
Hart & Cooley Co., New Britain, Conn.

Sal-Ammoniac.
Special Chemicals Co., Waukegan, Ill.

Schools—Sheet Metal Pattern Drafting.
St. Louis Technical Institute, St. Louis, Mo.

Schools—Warm Air Heating.
National Heatcraft Institute, Peoria, Ill.
St. Louis Technical Institute, St. Louis, Mo.

Screws—Hardened Metallic Drive.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Parker-Kalon Corp., 354 West 13th St., New York

Screws—Hardened Self-Tapping, Sheet Metal.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Parker-Kalon Corp., 354 West 13th St., New York

Screens—Perforated Metal.
Harrington & King Perforating Co., Chicago, Ill.

Shears—Hand and Power.
Marshalltown Mfg. Co., Marshalltown, Iowa
Peck, Stow & Wilcox Co., Southington, Conn.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.
Unishear Co., Inc., New York, N. Y.
Viking Shear Co., Erie, Pa.

Sheet Metal Screws—Hardened, Self-Tapping.
Parker-Kalon Corp., 354 West 13th St., New York

Sheets—Black and Galvanized.
Armco Distributors Ass'n of America, Middletown, Ohio
Burton Co., The W. J., Detroit, Mich.
Central Alloy Steel Corp., Massillon, Ohio
Inland Steel Co., Chicago, Ill.
Merchant & Evans Co., Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Osborn Co., The J. M. & L. A., Cleveland, Ohio
Ryerson & Son, Inc., Jos. T., Chicago, Ill.
Taylor Co., N. & G., Philadelphia, Pa.
Wheeling Corrugating Co., Wheeling, W. Va.

Sheets—Iron.
Armco Distributors Ass'n of America, Middletown, Ohio
Central Alloy Steel Corp., Massillon, Ohio
Merchant & Evans Co., Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Ryerson & Son, Inc., Jos. T., Chicago, Ill.

Sheets—Tin.
Merchant & Evans Co., Philadelphia, Pa.
Taylor Co., N. & G., Philadelphia, Pa.

Sheets—Zinc.
New Jersey Zinc Sales Co., The, New York, N. Y.

Shingles and Tiles—Metal.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Wheeling Corrugating Co., Wheeling, W. Va.

Shingles—Zinc.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Sifters—Ash.
Diener Mfg. Co., G. W., Chicago, Ill.

Sky Lights.
Lupton's Sons Co., David, Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Snips.
Peck, Stow & Wilcox Co., Southington, Conn.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.

Solder.
Chicago Solder Co., Chicago, Ill.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Soldering Furnaces.
Burgess Soldering Furnace Co., Columbus, Ohio
Diener Mfg. Co., G. W., Chicago, Ill.
Quick Meal Stove Co., St. Louis, Mo.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.

Soldering Supplies.
Special Chemicals Co., Waukegan, Ill.

Smoke Pipe—Cast Iron.
Waterloo Register Co., Waterloo, Iowa

Specialties—Hardware.
Diener Mfg. Co., G. W., Chicago, Ill.
Hessler Co., H. E., Syracuse, N. Y.

Stars—Hard Iron Cleaning.
Fanner Mfg. Co., Cleveland, Ohio

Statuary.
Friedley-Voshardt Co., Chicago, Ill.
Gerock Bros. Mfg. Co., St. Louis, Mo.

Stove Pipe Reducers.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City

Stoves—Camp.
Quick Meal Stove Co., St. Louis, Mo.

Stoves—Gasoline and Oil.
Quick Meal Stove Co., St. Louis, Mo.

Stoves and Ranges.
Quick Meal Stove Co., St. Louis, Mo.
Thatcher Co., Newark, N. J.

Tacks, Staples, Spikes.
American Steel & Wire Co., Chicago, Ill.

Tinplate.
Burton Co., The W. J., Detroit, Mich.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Osborn Co., The J. M. & L. A., Cleveland, Ohio
Taylor Co., N. & G., Philadelphia, Pa.

Tools—Tinsmith's.
Bertsch & Co., Cambridge City, Ind.
Burton Co., The W. J., Detroit, Mich.
Dries & Krump Mfg. Co., Chicago, Ill.
Hyro Mfg. Co., New York, N. Y.
Marshalltown Mfg. Co., Marshalltown, Iowa
Osborn Co., The J. M. & L. A., Cleveland, Ohio
Peck, Stow & Wilcox Co., Southington, Conn.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.
Viking Shear Co., Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill.
Whitney Metal Tool Co., Rockford, Ill.

Torches.
Burgess Soldering Furnace Co., Columbus, Ohio
Diener Mfg. Co., G. W., Chicago, Ill.
Quick Meal Stove Co., St. Louis, Mo.
Ryerson & Son, Inc., Jos. T., Chicago, Ill.

Trade Extension.
Copper & Brass Research Association, New York, N. Y.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.

Trimmings—Stove.
Fanner Mfg. Co., Cleveland, Ohio

Ventilators.
Aeolus Dickinson Co., Chicago, Ill.
Akrat Ventilators, Inc., Chicago, Ill.
Arex Company, Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Friedley-Voshardt Co., Chicago, Ill.
Kernchen Co., Chicago, Ill.
Lupton's Sons Co., David, Philadelphia, Pa.
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
Standard Ventilator Co., Lewisburg, Pa.
Sturtevant Co., Boston, Mass.

Ventilators—Ceiling.
Hart & Cooley Co., New Britain, Conn.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Tuttle & Bailey Mfg. Co., New York
Sturtevant Co., B. F., Boston, Mass.

Windows—Steel.
Lupton's Sons Co., David, Philadelphia, Pa.

Wire—Electrical.
American Steel & Wire Co., Chicago, Ill.

Wire Hoops.
American Steel & Wire Co., Chicago, Ill.

Wire Rope.
American Steel & Wire Co., Chicago, Ill.

Zinc.
Merchant & Evans Co., Philadelphia, Pa.
New Jersey Zinc Co., The, New York, N. Y.

WANTS AND SALES

Yearly subscribers to the AMERICAN ARTISAN may insert advertisements of not more than fifty words in our Want and Sales Columns WITHOUT CHARGE.

Such advertisements, however, must be limited to help or situation wanted, tools or equipment for sale, to exchange or to buy, business for sale or location desired. This privilege is not extended to manufacturers or jobbers—or those making a business of buying and selling used machines, employment agencies and brokers.

When sending advertisement state whether your name or blind number is to be used.

BUSINESS CHANCES

Lightning Rods—Dealers who are selling Lightning Protection will make money by writing to us for our latest Factory to Dealer Prices. We employ no salesmen and save you all overhead charges. Our Pure Copper Cable and Fixtures are endorsed by the National Board of Fire Underwriters and hundreds of dealers. Write today for samples and prices. L. K. Diddie Company, Marshfield, Wisc.

For Sale—Half interest in well established sheet Metal Shop. Furnace work a specialty. Using Standard Code. 6,000 population, 180 miles west of Minneapolis. $1,200.00 and man needed to take charge of business. Address Q-462, AMERICAN ARTISAN, 620 South Michigan Avenue, Chicago.

For Sale—Radiator shop, fully equipped, in town of 8,000 population. Business can be learned in a short time. Large territory to draw from. Rent $8.00 per month. Will sell cheap if taken at once. Address John Doll, 201 East 2nd Ave., St. Charles, Ill. t462

For Sale—Brand new stock of 44 furnaces of a well known make. Write for list of sizes and details. Must sacrifice. Address W462, AMERICAN ARTISAN, 620 S. Michigan Avenue, Chicago, Illinois.

For Sale—Going manufacturing business making a patented built-in mail box ready sale at 100% profit. Price $1,000.00 Address Mail Box, 1701 Oak street, Columbus, Ohio. H-463

SITUATION WANTED

Position Wanted—Sheet metal worker and furnace installer, 25 years' experienced, married, steady and of good habits. Also experienced in production work handling sheet metal department. Prefer Standard Code installation of the better class. Address L-463, AMERICAN ARTISAN, 620 So. Michigan avenue, Chicago, Illinois.

Situation Wanted—By first class tinner and furnace man. Can also do plumbing. 20 years' experience at the trade. Can lay out patterns. Neat workman, married. Prefer Iowa, Minnesota or S. Dakota. Address Z462, AMERICAN ARTISAN, 620 S. Michigan Avenue, Chicago, Illinois.

Wanted—Permanent position by all around sheet metal worker and plumber. Capable as foreman. Good layout and production man. Will also accept factory maintenance and efficiency position. Address K-463, AMERICAN ARTISAN, 620 So. Michigan avenue, Chicago, Illinois.

SITUATION WANTED

Position Wanted—As working foreman by a first class sheet metal worker in all its branches, such as may come to any first class shop. Can read blueprints and figure work. Have been handling men in all classes of work for the past 20 years. Wish to make change. Address Edward Collins, 128 Wentworth Street, Charleston, S. C. B463

Position Wanted—Good all around sheet metal and furnace man wants position; 11 years' experience and understands the Standard Code; can lay out patterns. Prefer a general job shop. Age 32 years. Can come at once. Address M-463, AMERICAN ARTISAN, 620 So. Michigan avenue, Chicago, Illinois.

Situation wanted by an all around, practical tinner. Can do outside and inside work and install furnaces; 30 years' experience; have worked in one shop for 15 years; want steady work; prefer southern Illinois. Address O-463, AMERICAN ARTISAN, 620 So. Michigan avenue, Chicago, Illinois.

Position Wanted—Tinner, Sheet metal worker and furnace man wants position in Illinois or Iowa. Can do anything in the sheet metal line. Sober. Address Tinner, 518 N. West Street, Galva, Ill. A463

Position Wanted—By a good tinner, plumber and furnace man. Twenty-five years at the trade. Good references. Married and reliable. Address Y462, AMERICAN ARTISAN, 620 S. Michigan Avenue, Chicago, Illinois.

Position Wanted—By pattern and template maker. I am also a sheet metal worker. Qualified to take charge of work and handle men. Address S-462, AMERICAN ARTISAN, 620 South Michigan Avenue, Chicago, Illinois.

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Situation wanted by all around sheet metal worker; skylight, ventilation, blow pipe and furnace work; layout and work from blue prints. Address P-463, AMERICAN ARTISAN, 620 So. Michigan avenue, Chicago, Illinois.

HELP WANTED

Wanted—A furnace man who at present is in business, or a practical furnace installer or a salesman who wants to go in business. To one who is honest and a hustler we have an A-1 position. This applies to anyone in Wisconsin or Illinois in their own respective city. Address C-463, AMERICAN ARTISAN, 620 So. Michigan avenue, Chicago, Illinois.

Wanted—Experienced tin shop foreman for superintendent of large shop which manufactures tin pipe and fittings for the trade. Man under 40 preferred, and one who has had factory experience can serve us best. Address D-463, AMERICAN ARTISAN, 620 So. Michigan avenue, Chicago, Illinois.

Wanted—Tinner and plumber to work in combination shop. Only a steady industrious and sober man need apply. Address Illinois Plumbing & Heating Co., DuQuoin, Illinois. E-463

TINNERS' TOOLS

Wanted—One set of Burritts Roofing Double Seamers and Tongs. Must be in good condition. State lowest cash price. Address J-463, AMERICAN ARTISAN, 620 So. Michigan avenue, Chicago, Illinois.

BOOKS

Exhaust and Blow Piping, by Hayes—Exhaust and Blow Piping has had an unusually big demand. A fresh supply is now off the press and is in our hands for immediate delivery. It has an invaluable treatise on the planning, cost, estimation and installation of fan piping in all its branches giving all necessary guidance in fan work blower and separator construction. 159 pages, 5x8. 51 figures. Cloth, $2.00. Order from Book Dept., AMERICAN ARTISAN, 620 South Michigan Avenue, Chicago, Illinois.

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X459

Experienced Manager and Salesman
with practical and technical knowledge of all branches of the warm air industry desires to make a change. Can handle successfully, selling or directing sales, designing, furnace fitting factory, and fan work. Have the best of reference. Will go anywhere but must have a reasonable time to assist a successor to the position I have held for 10 years. Address F463, American Artisan, 620 South Michigan Avenue, Chicago.

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TECHNICAL PRODUCTS COMPANY
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200,000 Perfect Installations!
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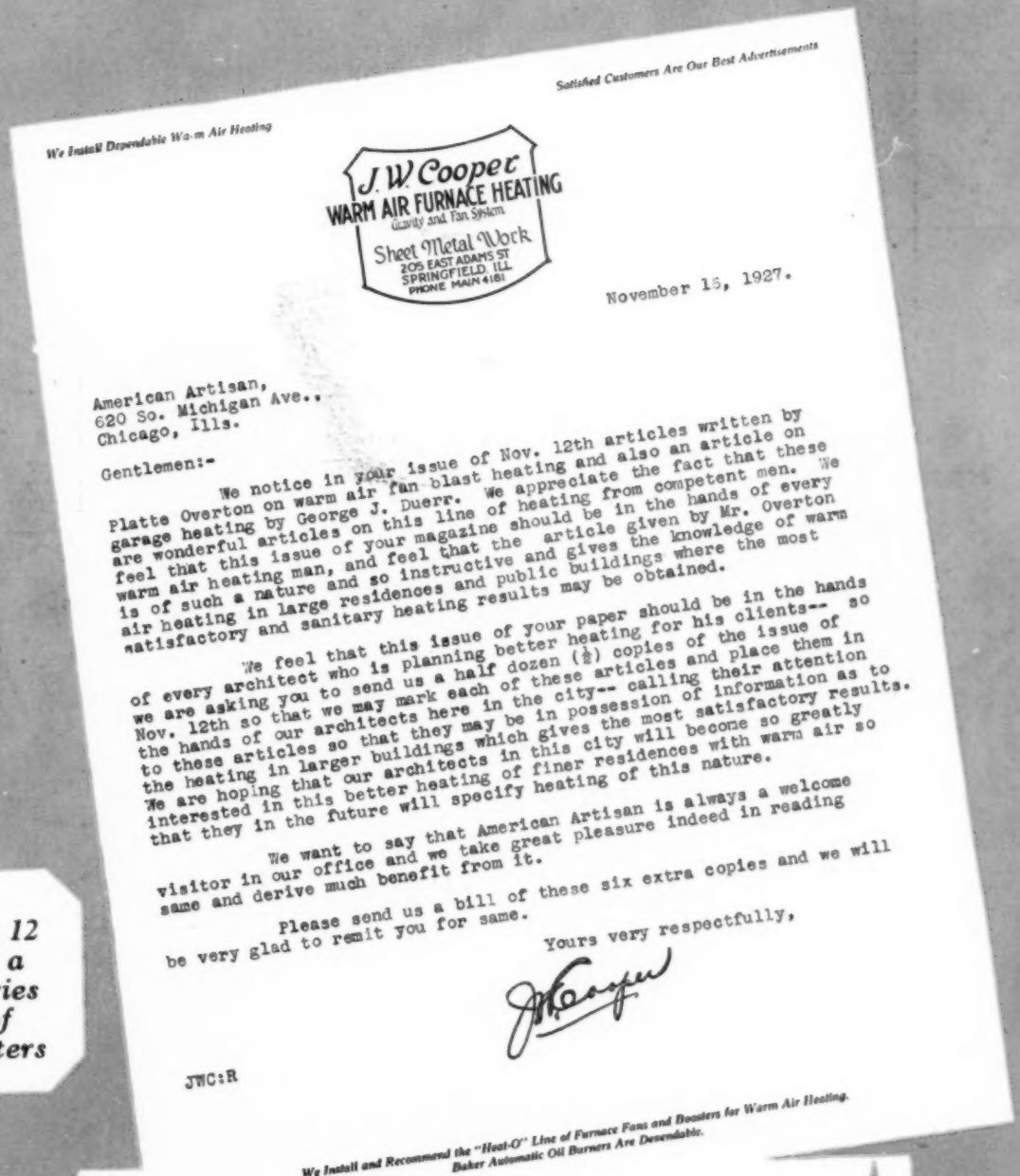

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PHONE MAIN 4181

November 16, 1927.

American Artisan,
620 So. Michigan Ave..
Chicago, Ills.

Gentlemen:-

We notice in your issue of Nov. 12th articles written by Platte Overton on warm air fan blast heating and also an article on garage heating by George J. Duerr. We appreciate the fact that these are wonderful articles on this line of heating from competent men. We feel that this issue of your magazine should be in the hands of every warm air heating man, and feel that the article given by Mr. Overton is of such a nature and so instructive and gives the knowledge of warm air heating in large residences and public buildings where the most satisfactory and sanitary heating results may be obtained.

We feel that this issue of your paper should be in the hands of every architect who is planning better heating for his clients-- so we are asking you to send us a half dozen (½) copies of the issue of Nov. 12th so that we may mark each of these articles and place them in the hands of our architects here in the city-- calling their attention to these articles so that they may be in possession of information as to the heating in larger buildings which gives the most satisfactory results. We are hoping that our architects in this city will become so greatly interested in this better heating of finer residences with warm air so that they in the future will specify heating of this nature.

We want to say that American Artisan is always a welcome visitor in our office and we take great pleasure indeed in reading same and derive much benefit from it.

Please send us a bill of these six extra copies and we will be very glad to remit you for same.

Yours very respectfully,

J. W. Cooper

JWC:R

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Baker Automatic Oil Burners Are Dependable.

No. 12 of a Series of Letters

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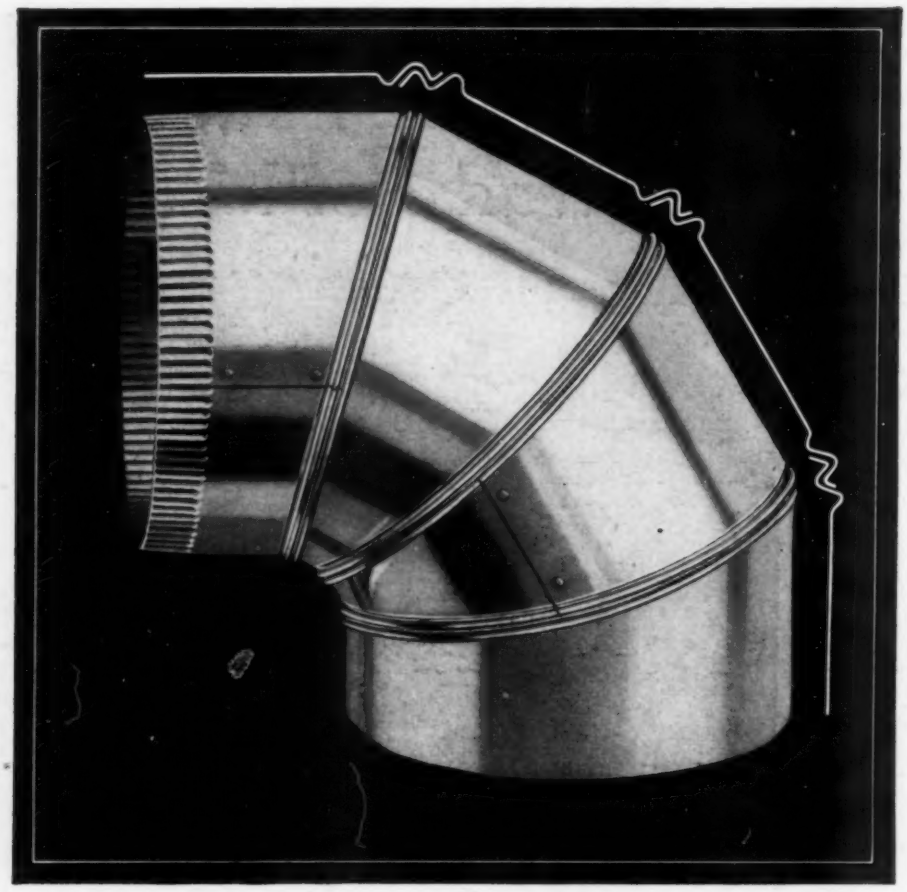

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Likewise Milcor Furnace Pipe and Fittings, Stove Pipe and Elbows, Conductor Pipe Elbows and the complete Milcor Line insure greater satisfaction than you have ever had reason to expect. Immediate deliveries, too, right from stock from Milwaukee, Chicago, Kansas City or La Crosse, on the same day your order arrives. Leading jobbers also carry the Milcor Line.

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